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TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1890.

No. 305. 30

ALLEN MAGOWAN, SPENCER M. ALPAUGH, AND FRANK A. MAGOWAN, APPELLANTS,

vs.

THE NEW YORK BELTING AND PACKING COMPANY.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF NEW JERSEY.

FILED NOVEMBER 28, 1887.

SUPREME COURT OF THE UNITED STATES.

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vs.

THE NEW YORK BELTING AND PACKING COMPANY.

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INDEX.

	Original.	Print.
Bond on appeal	1	1
Petition of appeal	4	2
Citation and proof of service of same	7	3
Bill of complaint	8	4
Answer	13	7
Replication	18	10
Evidence for complainant	19	10
Testimony of Julius Kahn	19	10
Exhibits offered	21	11
Testimony of Ebenezer Roby	22	12
Robert J. Rakers	27	15
Victor E. Burke	29	17
Matthew S. Gates	31	17
Dennis C. Gately	34	19
Evidence for defendants	38	22
Testimony of Allen Magowan	38	22
Wm. F. Harrison	41	23
Wm. W. Smith	62	37
James S. Lever	78	47
S. Lloyd Wiegand	97	59

JUDD & DETWEILER, PRINTERS, WASHINGTON, D. C., DECEMBER 1, 1890.

	Original.	Print.
Evidence for complainant in reply	161	97
Testimony of Dennis C. Gately	161	97
Ebenezer Roby	164	99
William Carlile	172	104
Marshall D. Davidson	177	107
Henry L. Brevoort	182	110
Frank C. Jones	199	120
Wm. Craig	203	122
Frederick H. Rickers	205	124
Henry L. Brevoort (cross)	212	128
Opinion of Judge Nixon	239	144
Interlocutory decree	244	146
Master's report	247	148
Final decree	256	152
Complainant's Exhibit A—Letters patent No. 86296, granted Dennis C. Gately, assignor, &c., Jan. 26, 1869	258	153
B—Certificate of organization of New York Belting and Packing Company	259	154
Defendants' Exhibit Tuck's English Patent, 1854	263	156
Tuck's U. S. Patent, 1855	270	159
Tuck's English Patent, 1852	277	162
Keirby English Patent, 1865	287	162
Keirby English Patent, 1866	293	171
Wise English Patent, 1865	298	173
McLean's U. S. Patent No. 63071, Mar. 19, 1867.	301	176
McBurney U. S. Patent No. 24569, June 28, 1859	303	176
Complainant's Exhibit Gately File Wrapper, &c.—File wrapper and contents in the matter of letters patent No. 86296, granted Dennis C. Gately, assignor; granted January 26, 1869	310	179
Clerk's certificate	319	182

1 United States Supreme Court.

NEW YORK BELTING AND PACKING COMPANY, Complainant, and ALLEN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN, Defendants. } In Equity. On Bill, &c.

Know all men by these presents that we, Allen Magowan, Spencer M. Alpaugh and Frank A. Magowan, and John H. Brewer and John Taylor, all of Trenton, in the county of Mercer and State of New Jersey, are held and firmly bound unto the New York Belting and Packing Company in the sum of twenty thousand dollars, lawful money of the United States of America, to be paid to the said New York Belting and Packing Company, its successors, certain attorney, or assigns; to which payment, well and truly to be made, we bind ourselves, our heirs, executors, and administrators, jointly and severally, firmly by these presents.

Sealed with our seals. Dated the nineteenth day of October, in the year of our Lord one thousand eight hundred and eighty-seven.

Whereas the above-named Allen Magowan, Spencer M. Alpaugh, and Frank A. Magowan have taken an appeal to the Supreme Court of the United States to reverse the decree rendered in the

2 above-entitled suit on the twenty-eighth day of October, eighteen hundred and eighty-seven, by the United States circuit court for the district of New Jersey:

Now, therefore, the condition of this obligation is such that if the above-named Allen Magowan, Spencer M. Alpaugh, and Frank A. Magowan shall prosecute their said appeal to effect and answer all costs and profits if they shall fail to make good their plea, then this obligation shall be void; otherwise to remain in full force and virtue.

ALLEN MAGOWAN. [L. S.]
S. M. ALPAUGH. [L. S.]
F. A. MAGOWAN. [L. S.]
JOHN H. BREWER. [L. S.]
JOHN TAYLOR. [L. S.]

Sealed and delivered in the presence of—
W. F. VAN CAMP.

STATE AND DISTRICT OF NEW JERSEY, *Mercer County*, } ss:

John H. Brewer and John Taylor, being duly sworn according to law, each upon his oath says that he is a citizen and resident of the State of New Jersey, and that he is *bona fide* the owner of real estate in the State of New Jersey worth above all incumbrances the sum of twenty thousand dollars, and that he is worth the sum of twenty thousand dollars over and above all his debts and liabilities.

JOHN H. BREWER.
JOHN TAYLOR.

3 Sworn and subscribed before me this twentieth day of October, 1887.

W. F. VAN CAMP,
[L. S.] *Notary Public.*

(Endorsed:) New York Belting and Packing Co., compl't & appellee, and Allen Magowan *et als.*, def'ts & appellants. Bond. Approved Oct. 21, 1887. Jno. T. Nixon, J. Filed Oct. 21, 1887. S. D. Oliphant, clerk.

4 United States Supreme Court.

THE NEW YORK BELTING AND PACKING COMPANY, Complainant,
and
ALLEN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN, Defendants.

To the honorable the Supreme Court of the United States:

The appeal of Allen Magowan, Spencer M. Alpaugh, and Frank A. Magowan, the above-named defendants and appellants, respectfully showeth—

That upon the seventeenth day of June, eighteen hundred and eighty-four, the above-named complainant filed its bill in the circuit court of the United States for the district of New Jersey against the above-named defendants and appellants, stating that the complainant was the owner of United States letters patent number 86296, dated January twenty-sixth, eighteen hundred and sixty-nine, granted to Dennis C. Gately for improved vulcanized rubber packing, and stating that the said defendants and appellants had infringed the complainant's exclusive rights thereunder by making, using, and selling at Trenton, in said district, vulcanized rubber packing embracing the invention secured by the said letters patent, and praying for an injunction and an account.

5 That the said defendants filed their answer to the said bill, denying such infringement of the complainant's rights under the said patent, and denying that the said Dennis C. Gately was the first and original inventor of the subject-matter of the said patent, setting out certain anticipating patents, and averring that in view of the state of the art the said letters patent exhibited no invention on the part of the said Dennis C. Gately, and denying the right of the complainant to the relief prayed in the bill.

That thereupon such proceedings were had that on the fifth day of March, eighteen hundred and eighty-six, an interlocutory decree was made and entered by the said court, which declared, amongst other things, that the said patent was valid and that the said defendants had infringed the same, and (the said patent having expired) ordering the defendants to account to the complainant.

That thereupon an accounting was had before a master, who reported that the complainant was entitled to recover from the defendants the sum of nine thousand and twenty-six dollars and sixty-six cents as profits made by them through said infringement.

That on the twenty-eighth day of September, eighteen hundred and eighty-seven, a final decree was made and pronounced in the cause, wherein it was, in substance, adjudged and decreed that the said master's report be in all things confirmed, and that the
6 complainant recover of the defendants the sum of nine thousand and twenty-six dollars and sixty-six cents so reported due, with the sum of seven hundred and forty-two dollars and five cents taxed costs, making in the aggregate the sum of nine thousand seven hundred and sixty-eight dollars and seventy-one cents, and that the complainant have execution therefor.

Wherefore the said appellants appeal from the whole of the said decree of said circuit court of the United States, and respectfully pray that the decree of the said circuit court and the bill, answer, pleadings, depositions, evidence, and proceedings in the said cause may be sent to the Supreme Court of the United States without delay, and that the said Supreme Court will proceed to hear the said cause anew, and that the said decree of the circuit court and every part thereof may be reversed and a decree made dismissing said bill with costs, or such other decree as the said Supreme Court may deem just and meet.

Dated September 29th, 1887.

G. D. W. VROOM,
Solicitor of Def'ts & App'l'ts.
F. C. LOWTHORP, JR.,
Of Counsel with the Def'ts & Appellants.

(Endorsed:) New York Belting and Packing Co., compl't & appellee, and Allen Magowan *et als.*, def'ts & appellants. Petition of appeal. Allowed October 21, 1887. Jno. T. Nixon, J. Filed Oct. 21, 1887. S. D. Oliphant, clerk.

7 By the Honorable John T. Nixon, one of the judges of the circuit court of the United States for the third circuit and district of New Jersey, to the New York Belting and Packing Company:

Whereas Allen Magowan, Spencer M. Alpaugh, and Frank A. Magowan have lately appealed to the Supreme Court of the United States from a decree lately rendered in the circuit court of the United States for the district of New Jersey (said decree having been rendered on the twenty-eighth day of September, eighteen hundred and eighty-seven), made in favor of you, the said New York Belting and Packing Company, and have filed the security required by law: You are therefore hereby cited to appear before the said Supreme Court, at the city of Washington, D. C., on Monday, the thirty-first day of October, eighteen hundred and eighty-seven, to do and receive what may appertain to justice to be done in the premises.

Given under my hand at the city of Trenton, State of New Jersey, in the third circuit, the twenty-first day of October, eighteen hundred and eighty-seven.

JNO. T. NIXON, *J.*

Due and timely service of the foregoing citation is hereby admitted.

Oct. 22, 1887.

TURNER, LEE & McCLURE,
Sol'rs for N. Y. Belting & Packing Company.

[Endorsed:] New York Belting and Packing Company, compl't & appellee, and Allen Magowan *et als.*, defend'ts & appellants. Citation.

8 *Bill of Complaint.* (*Filed June* 17, 1884.)

U. S. Circuit Court. In Equity.

To the honorable the judges of the circuit court of the United States for the third circuit within and for the district of New Jersey, sitting in equity:

The New York Belting and Packing Company, a corporation incorporated by and under the laws of the State of Connecticut, brings this its bill against Allan Magowan, Spencer M. Alpaugh, and Frank A. Magowan, of the city of Trenton, in the State of New Jersey, and citizens of the State of New Jersey, composing the firm of Magowan, Alpaugh & Magowan, of said Trenton.

And your orator further complains and says that heretofore, to wit, before the 26th day of January, 1869, one Dennis C. Gately, being the original and first inventor of a certain new and useful "improved vulcanized rubber packing," made application in due form of law to the proper department of the Government of the United States for the grant of its letters patent for such improvement.

And your orator further represents and shows that the said Dennis C. Gately, by assignment dated prior to the 26th day of January, 1869, duly assigned and transferred to your orator the full and exclusive right to all the said invention and improvement, as fully set forth and described in the specification prepared and executed preparatory to the obtaining of letters patent therefor, which said assign-

9 ment was duly recorded in the Patent Office, and to which said assignment, ready to be produced as this court may direct, or to a certified copy thereof, your orator begs leave for greater certainty to refer.

And your orator further represents and shows that thereupon such proceedings were had that letters patent of the United States, dated the 26th day of January, 1869, and numbered 86296, were issued in due form of law and delivered to your orator for the said invention, whereby there was granted to your orator, its successors, legal representatives, or assigns, for the term of seventeen years from the said date thereof, the exclusive right to make, use, and vend the said invention throughout the United States and the territories thereof, as in and by a certified copy of the said letters patent, ready to be produced as this court may direct, will more fully appear.

And your orator further shows that it has always, since the grant of the said letters patent and in the exercise of the exclusive rights

so granted as aforesaid, made, used, and vended to others to be used the said improvements so patented, and has had and maintained, until the infringement hereafter complained of, exclusive possession of the said improvements and invention under and by virtue of said letters patent, and has never acquiesced in any invasion or infringement of its said rights, and that the rights of your orator to the exclusive use and enjoyment of said invention as covered by said letters patent and acquiesced in by the public *has* been generally respected.

And your orator further shows unto your honors that in the year 1882, Ebenezer Smith and Matthew Gates, composing the firm of Smith & Gates, rubber dealers, of the city of New York, infringed upon and violated the exclusive rights of your orator under and by virtue of said letters patent, and thereupon, on the 20th day of May, 1882, your orator filed its bill of complaint in the circuit
10 court of the United States for the southern district of New York against said Smith and said Gates, and such proceedings were thereupon had that on the 2d day of June, 1882, an injunction was granted against said Smith and said Gates restraining them from infringing upon said letters patent, and such proceedings were thereupon had that on the 25th day of October, 1882, a final decree was made by said court and said injunction was made perpetual.

And your orator further shows unto your honors that the defendants herein, having full knowledge of the premises, and in violation of your orator's exclusive rights and privileges as aforesaid, and utterly disregarding the same, have, since the 26th day of January, 1869, without the license of your orator, at the city of Trenton, New Jersey, and at various other places in the United States, manufactured, used, and sold, and still continue to manufacture, use, and sell, vulcanized rubber packing embracing the improvements and invention described in said letters patent and so secured to your orator; but how much of said packing your orator is unable to say, but prays that the defendants may discover and set forth in their answer to this bill.

And your orator further shows unto your honors that it will be subject to great and irreparable injury unless it shall obtain from your honors the relief hereby sought.

To the end, therefore, that the said defendants may, if they can, show why your orator should not have the relief hereby prayed, and may, upon their several and respective corporal oaths and according to the best and utmost of their and each of their knowledge, remembrance, and belief, full, true, direct, and perfect answer make to all and singular the matters hereinbefore stated and charged as fully and particularly as if the same were hereinafter repeated and they and each of them thereunto distinctly interrogated,
11 and more especially that they and each of them may answer and set forth—

1. Whether they have not made or caused to be made or used or sold vulcanized rubber packing made substantially as described in said letters patent since the date thereof.

sion of the said alleged improvement by virtue of said letters patent, and they deny that it has never acquiesced in any invasion or infringement of its said alleged rights, and that said alleged rights have been acquiesced in by the public.

4th. These defendants admit that in the year 1882 the complainant brought suit against the firm of Smith and Gates, of New York city, for an alleged infringement by them of its alleged exclusive rights under said patent, and that in said suit both a preliminary and perpetual injunction was granted against said Smith and Gates, restraining and enjoining them from infringing upon said patent, as is stated in the bill of complaint. But these defendants say that the said Smith and Gates, not considering the matter to be of sufficient importance to warrant them in defending a patent suit, and not wishing to incur the considerable expense necessarily attendant thereon, made no defence to said suit nor attempted any, but allowed said orders and decrees to be taken by default, and were the more willing to do so as they were not called upon to account to the complainant, and the final decree called only for a perpetual injunction upon them; and these defendants insist that the decision of the court in said case can in no wise be considered as establishing the validity of the said letters patent.

5th. These defendants deny that they have, knowingly or otherwise, at any time, in any place, manufactured, and that they do manufacture, use, and sell vulcanized-rubber packing embracing any improvements or inventions described in said letters patent and secured to the complainant thereby.

6th. And for a further defence these defendants, upon information and belief, say that the said Dennis C. Gately was not the first and original inventor of the subject-matter specified and claimed in the said letters patent No. 86296, but that the said subject-matter or things substantially similar thereto were shown and described in the following letters patent, to wit:

United States letters patent No. 63071, to James McLean, dated March 19th, 1867.

No. 13145, to J. H. Tuck, dated June 26th, 1855.

English letters patent No. 384, to J. H. Tuck, A. D. 1852.

No. 1865, to J. H. Tuck, A. D. 1854.

7th. And these defendants further say that in view of the state of the art at and before the time of the said alleged invention of the subject-matter of the said patent No. 86296 by the said Dennis C. Gately, of which due proof will be made, the claim of said patent is too broad and claims and covers more than that (if anything) of which the said Gately was the first and original inventor.

7½. And these defendants, for a further defense, say that the said letters patent No. 86296 do not particularly point out and distinctly claim the alleged improvement of the said Dennis C. Gately, but that, on that contrary, the specification of the said patent fails to sufficiently distinguish that which was novel from that which was old in the art at the time of the first making application for said

patent, and is not distinct and clear, but indefinite and misleading in that respect and contrary to the policy of the statute under and by authority of which the patent was issued; and these defendants insist that said patent No. 86296 is on that account null and void.

8th. And these defendants, for a further defense, say that in view of the state of the art at and before the time of the said alleged invention by said Gately of the subject-matter of said patent No. 86296, of which due proof will be made, the thing described and claimed in said patent exhibits no invention whatever on the part of said Gately.

9th. And these defendants further say that the packing made and sold by them is not such as is described and claimed in complainant's said patent.

And these defendants say that by reason of the foregoing facts, severally, they are advised and believe that said letters patent No. 86296 are null and void.

All which matters and things these defendants are ready to aver, maintain, and prove as this honorable court shall direct.

17 In answer to the first interrogatory propounded to these defendants they answer that they have not made nor caused to be made or used or sold vulcanized-rubber packing substantially like any packing secured to the complainant by said letters patent since the date thereof.

And in answer to the second interrogatory they say that since the date of complainant's patent they have made no profit upon any packing made in accordance with said alleged invention and infringing any exclusive right of the complainant.

And these defendants submit to this honorable court that the complainant has no right to any further answer to its bill of complaint, or any part thereof, and no right to any injunction or account or other relief prayed for in said bill.

And they pray to be hence dismissed with their reasonable costs and charges in this behalf most wrongfully sustained.

G. D. W. VROOM,
Sol'r and of Counsel with Defendants.
F. C. LOWTHORP, JR.,
Of Counsel with Def'ts.

UNITED STATES OF AMERICA, }
District of New Jersey. }

Allan Magowan, Spencer M. Alpaugh, and Frank A. Magowan, being severally sworn, each on his oath says that he knows the contents of the foregoing answer, and that the matters and things therein stated upon his own knowledge are true, and the matters and things therein stated upon information and belief he believes to be true.

SPENCER M. ALPAUGH.
FRANK A. MAGOWAN.
ALLAN MAGOWAN.

Sworn to and subscribed before me this September 27, 1884.
[L. S.]
JOHN A. STEEN,
Notary Public, of New Jersey.

18 *Replication.* (*Filed October* 25, 1884.)

Circuit Court of the United States for the District of New Jersey.

THE NEW YORK BELTING AND PACKING COMPANY, Complainant,
and
ALLAN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN, Defendants.

These repliants, saving and reserving unto themselves all and all manner of advantage of exception to the manifold insufficiencies of the said answer, for replication thereunto say that they will aver and prove their said bill to be true, certain, and sufficient in the law to be answered unto, and that the said answer of the defendants is uncertain, untrue, and insufficient to be replied unto by these repliants; without this, that any other matter or thing whatsoever in the said answer contained material or effectual in the law to be replied unto, confessed and avoided, traversed or denied, is true; all which matters and things these repliants are and will be ready to aver and prove as this honorable court shall direct, and humbly pray as in and by their said bill they have already prayed.

Dated October 24th, 1884.

TURNER, LEE & McCLURE,
Solicitors for Complainant.

19 Circuit Court of the United States for the District of New Jersey.

THE NEW YORK BELTING AND PACKING COMPANY, Complainant,
vs.
ALLAN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN, Defendants.

NEW YORK, *November 19th*, 1884.

Met, pursuant to notice, at the office of Turner, Lee & McClure, No. 20 Nassau street, New York.

Evidence for Complainant.

Present: B. F. Lee, Esq., for complainant, and F. C. Lowthorp, Esq., for defendants.

JULIUS KAHN, being produced and sworn as a witness for complainant, says in answer to interrogatories propounded to him by complainant's counsel:

Q. 1. Where do you reside, Mr. Kahn?

A. No. 248 East 68th street, in the city of New York.

Q. 2. Do you know the defendants' place of business?

A. I only know their place of business. I do not know the defendants.

Q. 3. What is their factory in the city of Trenton known as?

A. The Trenton Rubber Works.

20 Q. 4. Look upon the piece of rubber packing that I now show you and state where and how you obtained the same.

A. I went to the office of the Trenton Rubber Works and asked for a piece of square rubber packing with an elastic backing, and some young man gave it to me. I don't know who he was. I cut this piece of packing off as soon as I got back to New York.

Q. 5. In whose possession has this piece of packing been since you cut it off?

A. I put it in envelope and sealed it, and wrote Trenton Rubber Works on, so I know it was not opened.

Q. 6. When did you open the envelope?

A. Just now, in your presence.

Q. 7. Please state how much packing you obtained at the time.

A. I guess it was about two pounds.

Q. 8. Please state what, if anything, you paid for the same.

A. I paid something over a dollar. I don't remember exactly how much it was.

Q. 9. State when this was, as near as you can.

A. Some time in May—the end of May, 1884.

The piece of packing referred to by the witness is offered in evidence, and the same is marked Complainant's Exhibit Trenton Rubber Works, May 27, 1884, J. K., S. D. Oliphant, examiner. The piece of packing referred to is divided into two pieces, both of which are marked as above stated, one to be kept until the hearing by each of the counsel for the respective parties hereto.

Cross-examined by Mr. LOWTHORP:

X Q. 10. Where is the Trenton Rubber Works?

21 A. My house sent me to Trenton to find out which rubber factory makes this square packing with rubber back, and I enquired on the street in Trenton where *there* the different rubber factories, and after I was in the Hamilton Rubber Company somebody told me I had to cross a bridge to get to the other rubber factories. Before I came to that bridge I was to the Star Rubber Company. I did not go in there. I went across that bridge, and somebody showed me the Trenton Rubber Works; somebody on the railroad, I guess. It is the first rubber factory on the right-hand side coming from the railroad track.

X Q. 11. Did you buy this packing that is shown at that place?

A. At that place. I do not know who sold it to me.

X Q. 12. Was that the only kind of packing you bought there?

A. Yes.

X Q. 13. You purchased no other sample differing from that?

A. No.

X Q. 14. Who is your house?

A. New York Belting and Packing Company.

JULIUS KAHN.

Subscribed and sworn to before me this 19th day of November, A. D. 1884.

R. A. PIPER,
[SEAL.] *Notary Public, N. Y.*

Counsel for complainant offers in evidence a certified copy of letters patent No. 86296, dated January 26th, 1869, granted to the New York Belting and Packing Company for improved vulcan-
22 ized-rubber packing, and the same is marked Compl't's Exhibit A., S. D. Oliphant, examiner.

Also an exemplified copy of the certificate of incorporation of the New York Belting and Packing Company, and the same is marked Compl't's Exhibit B, S. D. Oliphant, examiner.

Counsel for complainant offers in evidence a piece of packing, and the same is marked Complainant's Exhibit Trenton Rubber Works, 1882, and requested an admission that the same was sold by the defendants during the year 1882.

Counsel for defendants, having no knowledge that this packing was made or sold by the defendants, declines at this stage of the cause to make any *ads this stage of the cause to make any* admission concerning the same and objects to its introduction in evidence.

Two pieces of the packing referred to have been marked as above specified and are to be retained by the counsel of the respective parties until the hearing.

EBENEZER ROBY, being produced and sworn as a witness for complainant, in answer to interrogatories propounded to him says:

Q. 1. What is your name, age, residence, and occupation?

A. Ebenezer Roby; 55 years of age; reside in Brooklyn; engaged in the rubber business, at No. 15 Park Row, New York.

Q. 2. How long have you been engaged in the rubber business, and have you had any practical experience in rubber manufacture?

23 A. I have been in the rubber business since the year 1845 and engaged in the practical manufacture from 1845 to 1853, manufacturing goods for mechanical purposes, such as belting, packing, hose, &c. I am now connected with the New York Belting and Packing Company and have been since their organization, in 1856.

Q. 3. Have you read and do you understand the letters patent granted to said company as assignee of Dennis C. Gately, No. 86296, dated January 26, 1869, for improved vulcanized rubber packing?

A. I have. I am familiar with the patent.

Q. 4. Can you produce a specimen of packing made by the plaintiff, as described in said patent?

A. I can and hereby produce it.

Piece of packing referred to by the witness is offered in evidence an marked Complainant's Exhibit Patented Packing, S. D. Oliphant, examiner.

Q. 5. Please briefly explain the structure of the packing described and claimed in said patent and shown in the specimen which you have just produced and which is marked Exhibit "Patented Packing."

A. It is composed of plies of cloth coated with rubber and the cloth is cut bias and pressed together; then these plies of cloth are cut into strips of the proper size and on one side of this strip, on which the ends of the cloth project, is placed a coating of pure rubber; then the whole is vulcanized in one homogeneous mass.

Q. 6. Explain when the bias cutting takes place; whether while the different pieces or plies of cloth are separate or whether after they have been combined together, as you have described, to form the packing.

A. It can be done either way.

Q. 7. When the packing is made as shown in the Exhibit "Patented Packing" and in the patent, state the relation of the wearing surface to the ends of the thread.

24 A. When this packing is placed in the stuffing box the ends of the threads come in contact with the piston rod, constituting the ends of the thread the wearing surface. I have marked the wearing surface of Complainant's Exhibit "Patented Packing" with a cross.

Q. 8. Will you examine Complainant's Exhibit "Trenton Rubber Works, 1882," and state whether it differs from or resembles the packing which is described and claimed in the patent 86296?

Defendants' counsel objects to all questions and answers bearing upon Exhibit "Trenton Rubber Works, 1882," until it is shown to have been made by the defendants.

A. I have examined the exhibit and think it is precisely the same.

Q. 9. Will you examine the Complainant's Exhibit "Trenton Rubber Works, May 27, 1884," and state whether it substantially differs from or resembles the packing which is described and claimed in the patent 86296?

A. It is substantially the same, but varies from it in this respect: in the centre of it there appears to be a piece of rubber belting inserted which does not materially differ from the patented article, and, there is no doubt in my mind, was put there for adulteration. This part is marked X X.

The latter part of the answer, relating to the reason for inserting the strip, which appears to be rubber belting, is objected to as irresponsive to the question and irrelevant.

Q. 10. In respect to the two strips of packing on each side of the part marked X X, how do they compare with the complainant's packing described and claimed in patent No. 86296?

A. They are the same.

25 Q. 11. State whether the insertion of the piece marked X X, as shown in the specimen last referred to, improves the

packing over what it would have been if it had been made as shown in Complainant's Exhibit "Patented Packing."

A. It does not improve it.

EBENEZER ROBY.

Adjourned to Saturday, November 22d, 1884, at 11 a. m., at No. 20 Nassau street, New York.

NEW YORK, *Nov. 22d*, 1884.

EBENEZER ROBY—examination continued:

Q. 12. You say in your last answer "it does not improve it;" what effect does it have?

A. In my opinion, it is an injury to it.

Q. 13. Referring to your answer to question 9, please explain fully what you mean by that answer.

A. I should have said that the whole product does not differ materially from the patented article.

Q. 14. Please look upon Camplainant's Exhibit Trenton Rubber Works, 1882, and state your knowledge as to whether it is of the plaintiff's manufacture, stating first your means of knowing what you may have to say upon the subject.

A. I am perfectly familiar with the goods manufactured by the plaintiffs, having examined and sold their goods for over twenty years; also directing how they should be made. I am positive that this exhibit was not made by the N. Y. Belting and Packing C. First, the duck is not the same quality; and, finally, there is double the quantity of rubber between the plies. The exhibit I refer to is marked Compl't's Exhibit Trenton Rubber Works, 1882.

26 Cross-examined:

X Q. 15. Are there any other reasons why you know that is not a packing made by your company?

A. I do not see any other reasons.

X Q. 16. Do you smell any other reasons? I saw you smelling it a while ago.

A. It does smell a little different from our goods, and I should judge this is an old piece and the odor is nearly gone.

X Q. 17. You say, Mr. Roby, that the duck used in the sample is different from that used by your company. Are you sure that your company has never used any duck similar to that for manufacturing the Gately packing?

A. I could not swear positively that they never have, but I do not think they have.

X Q. 18. Can you swear positively that no packing of that kind, with the layers of rubber as thick as the layers between the plies of duck in that sample of packing, has ever been sold by your company?

A. To the best of my knowledge, there never has been any.

X Q. 19. You have not inspected all the packing of that kind sold by your company, have you?

A. I have not personally inspected it.

EBENEZER ROBY.

Subscribed and sworn to before me this 22d day of November, A. D. 1884.

R. A. PIPER,
[L. S.] *Notary Public, New York.*

It is admitted that the defendants are copartners, known as the Trenton Rubber Works, and have been such at a time preceding the alleged sale of the packing like Complainant's Exhibit Trenton Rubber Works, 1882, to Smith & Gates.

27 NEW YORK, *Nov. 22d*, 1884.

Met pursuant to notice.

Present: Counsel as before.

ROBERT J. RAKERS, being produced and sworn as a witness for the complainant, says, in answer to interrogatories propounded to him by complainant's counsel:

Q. 1. What is your name, age, residence, and occupation?

A. Robert J. Rakers; age, 23; residence, No. 772 Park avenue, Brooklyn; occupation, book-keeper for Ebenezer Smith, 75 Fulton street, New York.

Q. 2. Is the Ebenezer Smith referred to the same person who was formerly one of the partners in the firm of Smith & Gates, in the city of New York?

A. He is.

Q. 3. Were you ever in the employ of the firm of Smith & Gates; and, if so, when and in what capacity?

A. From the 28th of February, 1880, until they dissolved partnership, February 16th, 1884.

Q. 4. During the early part of the year 1882 or the latter part of the year 1881 did the said firm of Smith & Gates buy and sell what is known as rubber-backed packing?

A. They bought and sold rubber-backed packing, but I cannot tell whether it was that date or not. I think it was about that time.

Q. 5. It was while you were in their employ, was it not?

A. Yes, sir.

Q. 6. Did the firm of Smith & Gates ever purchase any rubber-backed packing like that which I now show you?

A. They bought rubber-backed packing that looked similar to that sample.

The sample referred to is marked Exhibit Trenton Rubber Works, 1882.

28 Q. 7. From whom did they buy the rubber-backed packing referred to in the last question and answer?

A. They bought rubber-backed packing from the Trenton Rubber Works, and they may have brought some from the N. Y. Belting and Packing Company.

Q. 8. Did they buy rubber-backed packing from any other person, firm, or corporation except those two you have mentioned?

A. They did not.

Q. 9. Do you remember how much rubber-backed packing was purchased at any one time by the firm of Smith & Gates from the Trenton Rubber Works?

A. I do not.

Q. 10. Do you remember any such purchase to the extent of 2,000 pounds or more?

A. I do not remember it.

Q. 11. Can you give any idea of the quantity of rubber-backed packing purchased by the firm of Smith & Gates of the Trenton Rubber Works?

Objected to as irrelevant.

A. I believe it was about 2,500 pounds.

Q. 12. Do you come here voluntarily or because you have been subpœnaed?

A. Because I have been subpœnaed.

Q. 13. Was the purchase made at different times or was it all made at one time?

DEFENDANTS' COUNSEL: All questions relating to the relations between the Trenton Rubber Works and Smith & Gates objected to as incompetent and irrelevant.

A. At different times.

Q. 14. State, as nearly as you can, between what periods of time these purchases were made.

Same objection.

A. I cannot say.

29 Cross-examined:

X Q. 15. (Complainant's Exhibit Trenton Rubber Works, 1884, shown witness.) You stated in your answer to a former question that the firm of Smith & Gates had dealt in rubber-backed packing like that shown in the exhibit I have referred to; state your reasons for making that statement.

A. In answer to the former question I said it was similar to this.

X Q. 16. In what respect was it similar?

A. It was made of layers of cloth and rubber.

X Q. 17. Is that all you have to answer to that question?

A. I believe that is all I can say to that question; it was made of layers of cloth and rubber similar in appearance to the sample; that it was exactly the same I cannot say.

ROBERT J. RAKERS.

Subscribed and sworn to before me this 22d day of November, A. D. 1884.

[L. S.]

R. A. PIPER,
Notary Public, New York.

VICTOR E. BURKE, being produced and sworn as a witness for complainant, says, in answer to interrogatories propounded to him by complainant's counsel:

Q. 1. What is your name, age, residence and occupation?

A. My name is Victor E. Burke; age, 22; residence, 59 East 112th street, New York city; my occupation, clerk in the New York Belting & Packing Company.

30 Q. 2. Do you know the place of business of the late firm of Smith & Gates?

A. It was down in Fulton street, about number 79, on the corner of Gold street.

Q. 3. Did you ever purchase of them any rubber-backed packing? And, if so, state as nearly as you can when?

A. The early part of May, 1882.

Q. 4. Look upon the packing that I now show you and state what it is.

A. I bought that packing from Smith & Gates. I put my initials on it at the time I bought it.

Q. 5. Was this the purchase referred to in your answer to question 3 as made in the early part of May, 1882?

A. Yes, sir.

Q. 6. The New York Belting & Packing Company manufactures and sells rubber-backed packing, does it not?

A. Yes, sir.

Q. 7. Is the packing that I have just shown you made by the New York Belting & Packing Company or is it made by some one else?

A. I could not say.

It is admitted that the Complainant's Exhibit Trenton Rubber Works, 1882, is a piece of the same packing referred to in questions 4 and 5 and the answers thereto.

Not cross-examined.

VICTOR E. BURKE.

Subscribed and sworn to before me this 22d day of November, A. D. 1884.

[L. S.]

R. A. PIPER,
Notary Public, New York.

31 MATTHEW S. GATES, being produced and sworn as a witness for complainant, says, in answer to interrogatories propounded to him by complainant's counsel:

Q. 1. What is your name, age, residence, and occupation?

A. Matthew S. Gates; age, 45; residence, 782*a* Greene avenue, Brooklyn; occupation, rubber business.

Q. 2. Were you ever a member of the firm of Smith & Gates?

A. Yes, sir; I was.

Q. 3. When did such partnership begin and when did it end?

A. It began on the 1st of May, 1879, and ended on the 16th of February, 1884.

Q. 4. Who were the members of that firm besides yourself?

A. Ebenezer Smith was the only one.

Q. 5. Did your firm, in the latter part of the year 1881 or the early part of 1882, purchase of the defendants any rubber-backed packing?

A. Those may have been the exact dates, but we purchased the packing all the same.

Q. 6. What is the defendant's house known as?

A. It is known as the Trenton Rubber Works.

Q. 7. And where is their factory?

A. In Trenton, New Jersey.

Q. 8. State as nearly as you can the time when your firm purchased rubber-backed packing from the Trenton Rubber Works.

A. I haven't got the least idea of dates, not a particle. I guess it was in 1881, though.

Q. 9. It was during the partnership, was it not?

A. Yes, sir.

Q. 10. Some of the packing so purchased was purchased at least a year before your firm dissolved, was it not?

32 A. It was more than two years before the dissolution of the firm.

Q. 11. Look upon the packing that I now show you, marked Complainant's Exhibit Trenton Rubber Works, 1882, and state whether you recognize the same, and, if so, state what it is.

A. I cannot tell. I recognize it as rubber-backed packing, but I cannot tell by whom it was made.

Q. 12. From whom beside the Trenton Rubber Works did your firm purchase rubber-backed packing?

A. From the New York Belting and Packing Company.

Q. 13. Please state whether or not the samples of packing just shown you resembles any of the packing purchased and dealt in by your firm.

A. It does.

Q. 14. Please state whether or not it resembles the rubber-backed packing purchased by your firm of the Trenton Rubber Works or purchased by your firm of the complainant, The N. Y. Belting and Packing Company.

A. It does.

Q. 15. Which one?

A. It resembles either.

Q. 16. You cannot tell which it is?

A. I cannot.

Q. 17. But your firm did deal in packing like the sample?

A. Yes, sir.

Cross-examined:

X Q. 18. In what respect does the exhibit shown you resemble the packing in which you dealt?

A. The general appearance of it.

X Q. 19. Is that all?

A. Yes, sir; all I can testify to.

X Q. 20. Is its general similarity, then, due simply to the fact that it is made of plies of duck united together with rubber and having an elastic backing?

33 A. Yes; it is.

X Q. 21. Can you state any other reason for that similarity?

A. No; I cannot.

Redirect examination:

R. D. Q. 22. Do you know any one of the defendants; and, if so, which one or ones?

A. I know Frank A. Magowan and Spencer M. Alpaugh.

R. D. Q. 23. By what other firm name are the defendants known besides the Trenton Rubber Works?

A. I do not know of any.

R. D. Q. 24. Did your firm purchase elastic rubber-backed packing from any firm, individual, or corporation besides the N. Y. Belting and Packing Company and the Trenton Rubber Works?

A. Not to my knowledge; I did not do the buying. I never heard of purchase- from any one else.

M. S. GATES.

Subscribed and sworn to before me this twenty-second day of November, A. D. 1884.

R. A. PIPER,
[L. S.] *Notary Public, New York.*

Adjourned to Friday, November 28th, 1884, at eleven o'clock a. m.

34 NEW YORK, *December* 1, 1884.

Met at the office of Turner, Lee & McClure, 20 Nassau street, New York, pursuant to adjournment and notice.

Present: counsel as before.

DENNIS C. GATELY, a witness produced and sworn on behalf of complainant, says, in answer to interrogatories propounded to him by complainant's counsel:

Q. 1. What is your name, age, residence, and occupation?

A. My name is Dennis C. Gately; my age is sixty-eight; my residence is at Mamaroneck, N. Y.; at present I am not in business.

Q. 2. Were you ever connected with the New York Belting and Packing Company, the complainant herein; and, if so, in what capacity, and when did such connection cease?

A. Yes, I have been connected with it since 1856, as general superintendent of the company; my connection with the company ceased the 1st of last July.

Q. 3. Are you the person upon whose application the letters patent No. 86296, upon which this suit is brought, was granted?

A. Yes; I am the same person.

Q. 4. Please look upon the Complainant's Exhibit Patented Packing and state whether or not you, as superintendent of the New

York Belting and Packing Company, ever made any packing like the exhibit.

A. Yes, we made packing like this, as far as I can see by its general appearance; it is just like ours.

Q. 5. Please look upon the Complainant's Exhibit Trenton Rubber Works, 1882, and state whether or not the N. Y. Belting and
35 Packing Company, while you were with it, ever made any packing like the exhibit.

A. No; we never did.

Q. 6. What differences do you notice between the exhibit and the packing made by complainant?

A. I notice a difference in the back; this piece of packing, being the exhibit referred to, has only one piece of canvas on the back, while ours—we always put two on ours. I notice, also, that this piece of packing has more rubber between the plies than we put in.

Q. 7. You said, in answer to Q. 2, that you were general superintendent of the complainant. Will you please state whether or not your duties included the superintendence of the manufacturing department?

A. Yes; I was general manager of the manufacturing department.

Q. 8. While you were such general manager where did you reside?

A. I resided at the place of the company's factory, within fifty rods of it, at Newtown, Connecticut; the place is generally called Sandy Hook.

Q. 9. And your work was mostly at the factory and not at the office?

A. My duties were entirely at the factory; I was rarely at the office.

Q. 10. Where was the general business office of the company while you were with it?

A. For about 20 years it was at Nos. 37 and 38 Park Row, New York; they were burned out there about two years ago, and they moved a few doors away; they are now at No. 15 Park Row.

Cross-examination by defendants' counsel:

X Q. 11. When you were describing the differences between the exhibits—Complainant's Exhibit Patented Packing and Complainant's Exhibit Trenton Rubber Works, 1882—you stated that
36 the latter had upon the back but one ply of canvas. Do you know, certainly, that no such packing ever went out of your shop with but one ply of canvas on the back?

A. Why, I can be as positive as I can of anything; it was almost impossible that such a thing could happen.

X Q. 12. Why was that almost impossible?

A. Because it was our rule to make it with two plies of canvas on the back, and no one had the right to change it without my instructions to do so.

X Q. 13. Is that, then, the only reason?

A. Well, being constantly at the factory, it would be next to impossible to send it away with any change without my knowledge.

X Q. 14. Why?

A. Because, I having the general superintendence and examining the goods constantly before they went out, it would be almost impossible for them to go out with any change without my knowing it.

X Q. 15. Did you, as a matter of fact, examine yourself all the goods which went out of the factory?

A. I might say yes, that I did, from the fact that I was constantly at the factory. I did not pick up every piece of stuff that was made at the factory.

X Q. 16. You mentioned also that the layers of rubber between the plies of duck, which are placed vertically to the elastic packing, were thicker in the second exhibit than in the first. Do you know that those rubber layers were never made so thick at your factory as those found in Exhibit Trenton Rubber Works, 1882?

A. I think I can say safely that they never were.

X Q. 17. Are you sure that no packing went out of your factory at any time with layers of rubber in it as thick as those in this exhibit?

37 A. I have good reason to believe that none ever went out as thick, for the reason that our mode of coating would not lay on a coat as thick as this appears to be in the Exhibit Trenton Rubber Works, 1882. Our canvas is coated by a friction machine which leaves a very thin coating of rubber. We always have used this friction machine since we have made this packing.

Redirect:

R. D. Q. 18. If a piece of packing like the Exhibit Trenton Rubber Works, 1882, had gone out of your factory, state whether or not it could have been made there for the company without an express disobedience of orders on the part of your employees.

A. Yes; that is so; no one had a right to make it any other way.

R. D. Q. 19. If a piece of packing like the Exhibit Trenton Rubber Works, 1882, had gone out of your factory, state whether or not, in your opinion, such a thing would have been noticed by the company's salesmen or by its customers.

A. I think not, as a general thing. I don't think they would notice it in ordinary purchasing.

R. D. Q. 20. When such packing came to be used would the difference be noted?

A. Yes; I think it would be noticed. I think the effect on the stuffing box would be noticed—the greater amount of rubber in the Exhibit Trenton Rubber Works, 1882.

D. C. GATELY.

Subscribed and sworn to before me this 1st day of December, A. D. 1884.

R. A. PIPER,
Notary Public, New York.

[L. S.]

Complainants rest their *prima facie* case.

38 United States Circuit Court, District of New Jersey.

THE NEW YORK BELTING AND PACKING COMPANY
vs.
ALLEN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN. } In Equity.

Proofs for final hearing on the part of the defendants, taken before Lewis W. Scott, a standing examiner of said court, under and pursuant to the 67th rule in equity, as amended.

TRENTON, N. J., *January 7th*, 1885.

Met pursuant to notice.

Present: F. C. Lowthorp, Jr., Esq., of counsel with defendants, and B. F. Lee, Esq., of counsel with complainants.

Mr. ALLEN MAGOWAN, a witness produced on the part of the defendants, being duly sworn according to law, deposeth and saith:

Direct examination by Mr. LOWTHORP:

Q. Mr. Magowan, you are one of the defendants in this case, are you not?

A. Yes, sir.

Q. You are a practical rubber manufacturer, are you not?

A. Yes, sir.

39 Q. How long have you been engaged in that business?

A. I suppose about 28 or 30 years.

Q. Are you familiar with the elastic back packing which has been made under Tuck's patent, known as Tuck's packing?

A. Well, I think so.

Mr. LEE: The examination of this witness is objected to, so far as it tends to show prior use or knowledge, as not properly pleaded.

Q. Will you just describe that packing in general terms?

A. Well, the Tuck's patent? Well, the packing that we have made—that I saw made before the war or during the war—is similar to the packing we have been making all along.

Q. Just describe it in general terms.

A. We first take the roll of duck and friction it and pull it out on the table and cut it bias and roll it up—with a solid piece of gum on the inside and roll it up—then put that in the vulcanizer and vulcanize it.

Q. This then was made into rolls, was it?

A. It was made in rolls about twelve feet long. We make it from one-quarter inch to two inches and a half in diameter.

Q. When did you first make that sort of packing?

A. Now, I can't exactly give the dates; it was during the war.

Q. During the war of the rebellion?

A. Yes, sir.

Q. Where did you make that packing?

A. Paterson, New Jersey.

Q. In whose shops?

A. Bramhall & Sinclair.

Q. When you say duck was frictioned what do you mean?

A. When it goes through the rolls just enough gum is wiped
40 into this duck to make it stick and hold together, and then as we roll it up it sticks together.

Q. Did I understand that there is in fact a thin layer of gum between each two layers of duck?

A. Yes.

Q. Did you make that packing in any other form?

A. We made it square; just put one coat of duck, and put one layer on top of another until they get it the desired thickness; then it was cut into square strips; make it from one-quarter to two and one-half inches thick.

Q. This was done before the year 1865?

A. Yes, sir.

Q. That was known as Tuck's packing, was it not?

A. That is what I understand as Tuck's packing.

Q. Mr. Magowan, how was that duck cut bias? Was it done before you rolled it?

A. Yes, sir.

Q. By the length of the duck?

A. In cutting it bias we pulled it out straight on the table and then cut it across diagonally; we turned the selvedge edges right around together.

Cross-examination by Mr. LEE:

Q. Please loook upon the specimen of packing now shown you and state whether it is not the article which you have spoken of as Tuck's packing?

A. It is the same as we made.

ALLEN MAGOWAN.

Sworn to and subscribed before me this seventh day of January, 1885.

LEWIS W. SCOTT, *Examiner.*

41 Complainant's Exhibit Tuck's Packing, specimen of packing referred to by the witness offered in evidence and marked "Complainant's Exhibit Tuck Packing, January 7th, 1885, Lewis W. Scott, examiner."

United States Circuit Court, District of New Jersey.

NEW YORK BELTING AND PACKING COMPANY
vs.
ALLEN MAGOWAN and Others. } In Equity.

PHILADELPHIA, *January 12th*, 1885.

Met, pursuant to adjourment, at the office of S. L. Wiegand, 146 South Sixth street, Philadelphia, on the 12th day of January, 1885.

Present: As above.

WILLIAM F. HARRISON, a witness called on behalf of defendants, being duly sworn according to law, deposeth as follows:

Direct examination by Mr. LOWTHORP:

Q. What is your name, residence, and occupation?

A. William F. Harrison; residence, Wilmington, Delaware; occupation, machinist and engineer.

Q. Where were you employed during 1864?

A. I was employed as assistant engineer in the Confederate navy.

42 Q. You served on what vessel?

A. I was serving on several; first, on the Richmond, and I also served on the Hampton and the Roanoke, and I was also in the torpedo service.

Q. As such engineer what were your duties generally?

A. I had to keep the engine in thorough repair and see that she was always ready for use.

Q. Are you familiar with packing used on steam-engines at that time?

A. Thoroughly.

The examination of this witness is objected to, so far as it tends to show prior use or knowledge, on the ground that it is not properly pleaded.

Q. What kind of packing did you use upon the engine under your charge during that year?

A. We used whatever we could get hold of. The supplies were very deficient, and we used hemp, gum hose, lamp wick, and anything that we could get that would answer the purpose.

Q. You say you used gum hose; how did you use that hose?

A. Sometimes we used it in whole pieces; sometimes we cut it.

Q. Into strips?

A. Into strips to fit the box we wished to pack.

Q. (Section of hose being shown witness.) Did you use any hose similar to that?

Objected to as leading.

A. Yes, sir.

Q. Just describe how you used that hose.

Counsel for defendant- requested that the piece of hose
43 handed to witness be marked for identification. The same was marked "A," L. W. S., examiner.

A. It was generally old hose that we used, such as was of no service anywhere else. Sometimes we crushed it in that shape.

Q. Flattened it?

A. Yes, sir; flattened it; forced it into the box in that way. Again, we cut it into strips lengthwise of the hose and bent it around the rod and forced it in.

Q. Bent the strips around?

A. Yes, sir.

Q. Any other way?

A. Sometimes we put pure rubber on the back, wrapping the two together with lamp wick while getting them into the box.

Q. What did you refer to as being wrapped with lamp wick that you spoke of in your last answer?

A. I do not quite understand you.

Q. Would you use the hose crushed or flattened as you say with pure gum backing, with lamp wick wrapped about it, or would you use it in strips, or what?

A. Used the strips.

Q. You say those strips were cut lengthwise of the section of hose?

A. Lengthwise of the hose.

Q. (A strip of hose marked for identification "B," L. W. S., being shown witness.) State whether or not that resembles a strip or section of the hose you spoke of cutting as you described.

Objected to as leading.

A. It does.

Q. In what way does it resemble it?

A. It is like any other hose cut that ever I saw or took particular notice of.

Q. (An article being shown witness.) What is that?

44 A. I should take that to be gum, what we would call in our business as sheet gum, a quarter thick, quarter sheet gum, as we term it in our business.

Q. Does it or not in any way resemble the gum you have spoken of, which you say you used as a backing or as forming part of the packing in the work above referred to by you, and if it does resemble it in any way how does it resemble it?

Objected to as leading.

A. That is a hard question to answer, in what way it resembles it, because nearly all manufactured gum is about alike.

Q. You can just state generally.

A. It has a general resemblance; that is all I can say in reference to it. It is about the same article that we use.

The article was offered for identification and marked "C," L. W. S.

Q. Can you show us how you used the strips of hose which you refer to, wrapped with lamp wick, with the gum backing of which you have spoken?

A. We used them in that manner (witness illustrates); that is the way it was placed in the box.

The illustration was as follows: A portion of the strip marked "C" was laid against a portion of the strip marked "B," and the two united by lamp wick, the said parts B and C being cut off and now form part of Exhibit "D."

Q. I notice in this packing which you have made and which is marked for identification "D" that in the portion of it which is

marked "B" the plies of duck appear to be cut bias; the
45 ends of the thread appear upon the surface of the side cut.
Can you remember or not how the hose which you used was in that respect, whether the duck was bias or straight?

A. It must have been from the way hose is manufactured. You can't cut it in any other way but what it will show two ends of the fibres in that way.

Q. Do I understand that it was made with the duck cut bias?

A. The way hose is made the duck is wound in that way, and if you cut it lengthwise it must show the grain that way.

Q. It must show the ends of the thread?

A. Yes, sir.

Q. Will you please tell us which portion of this packing, of this piece marked "D," was placed next to the wearing surface?

A. The thread fibre. The gum was next to the box. The gum was outside the fibres next the rod.

Q. Then do I understand you that the plies of duck bore vertically against the wearing surface?

A. They bore all around the wearing surface.

Q. They were arranged, then, so that the ends of the thread came against the wearing surface?

Objected to as leading.

A. Against the wearing surface.

Q. Did you ever use this in any other way, these pieces marked "B" and "C"?

A. I have sometimes used them reversed; placed the gum here.

Q. How is that?

A. In this way, but it does not give as good results; it will peel off.

The witness here takes Exhibit "B" in his hand and points
46 to the thin gum which is opposite the thick gum surface, said thin gum surface being the one wearing against the piston rod.

Q. In this packing marked "D" what was the effect of using this gum backing?

A. It gives it elasticity.

Q. Why did you desire elasticity in that packing?

A. It made a better joint on the rod and allowed for any inequality of the wearing surface. The rod will not always work parallel, and it is necessary to have this elasticity to follow up the high and low places.

Q. Was the idea to keep the packing close to the rod or around it; if not, what was the idea?

A. That was the idea; by keeping the packing close we prevent the escape of steam.

Q. When did you use this packing which is marked "D"?

A. In 1864.

Q. Where did you use it, Mr. Harrison?

A. I used it in the Confederate navy.

Q. On what vessel?

A. On the Roanoke and on the Hampton. I used it on the torpedo steamer also.

Q. At what place were these steamers when that packing was in use?

A. On the James river, Virginia, and on the Cape Fear river, North Carolina.

Q. Do you know what is commonly called Tuck's packing?

A. Yes, sir.

Q. Can you give us a general description of that packing?

A. I can tell you better by seeing it or a sample of it or cut of it. It is canvas and gum wound. I have seen various shapes to it; some of it is square, but it has sometimes a gum core with canvas wound around, layers of gum and canvas alternately.

47 Q. Where is that gum core placed?

A. When it has a core it is in the centre, but there is a Tuck packing, I believe, made with a piece of gum near one edge of it, or back of it, and then a layer of canvas and gum alternately over that wound together.

Q. (The drawing annexed to Tuck's English patent, dated August 25th, 1854, No. 1865, being shown witness.) Please state whether or not either of the drawings upon that paper represents or in any way approximates a sectional view of any packing that you have seen.

Objected to as leading.

A. I recognize No. 9 as a packing that I have frequently used.

Q. You have frequently used? What packing was that?

A. I can't tell you what packing it was, whether it was Tuck's packing or not, but I recognize the packing.

Q. How was the packing made?

A. Made as here represented.

Q. In sections? What materials were used in its construction?

A. Canvas and gum and hemp; I suppose it was canvas; it looks like canvas. I recognize No. 9; also No. 4.

Q. Please state how the packing of which drawings 9 and 4 are supposed to be representations which you recognized were made.

Objected to on the ground that the witness has not been shown to be qualified to answer on the subject.

A. I am not familiar with the manufacture of these. I only know what they show in sections when they are cut off.

Q. State what they show.

48 A. They show as represented on the paper, with a gum backing and a hemp or canvas winding and alternate layers of gum.

Q. Were those packings you speak of square or oblong in shape in the section.

A. Square.

Q. Was there or not any material between the layers of canvas or

duck of which it was constructed; and, if so, what was the material, to the best of your recollection?

A. It was a cement of gum. I suppose it was gum; it looked very much like it and had every appearance of it.

Q. Did you ever use any of that packing?

A. Frequently.

Q. How did you use it?

A. Used it in regular sizes when we could get it. If the sizes were not right we would split it.

Q. You say you would split it if the sizes were not right. How was that done?

A. Lengthwise of the packing; paring it down to the proper dimensions to fit the box.

Q. Did you split off any particular side or not?

A. Yes; we always split off the fibre side.

Q. Did you or not ever remove from the packing in such splitting the rubber core that you say was in it?

A. Not entirely. Sometimes a portion of it would be removed where we pared the packing down very much to get it in, and by taking off too much fibre—that is, taking off enough to fill the box—then, of course, it would be necessary to take off some of the gum so as to remove a portion of the fibres remaining.

Q. When that was done what came in contact with the rod or other wearing surface?

A. The fibre.

Q. Where then would the gum core be used?

A. At the outside, next to the walls of the stuffing box.

49 Q. Do I understand you that you never allowed any portion of the gum core to come next to the wearing surface or the rod?

A. Never; it would not stand there any length of time.

Q. What was the position of the layers of canvas or duck of this packing when you cut it down relatively to the wearing surface or rod?

A. That depended upon how far you cut it and the size of it. If you cut it down half way, then it presented the edges of the fibre; if only a portion of the way, then it would present the flat layer.

Q. Did you ever cut it down half way?

A. Yes, sir; more than half way.

Q. Did you ever cut it down less?

A. Yes, sir; less than half way, and then quartered it again so as to get it to fill small boxes.

Q. This quartering was cutting it how?

A. I don't know how to demonstrate it to you.

Q. In this quartering did you make the second cut on a plane parallel with the plane of your first cut?

A. At right angles.

Q. Where did you ever cut this packing of which you are speaking so that the edges of the layers of duck would be presented to the wearing surface?

A. I cut that on the steamer Hero.

Q. Where was that steamer when she had packing cut that way in use upon her?

A. In the British West Indies, running from the Island of Trinidad to Bolivar to Venezuela.

Q. In what year was that?

A. In the year 1874.

Q. Did you ever cut this packing in the way you have just described and use it upon any other vessel or in any other places?

50 A. I don't know; I have used so much packing I can hardly place it. I know that I frequently cut packing, but to describe it and tell exactly where and when I cut it I could not do it, or to say positively that it was really that packing that I cut at that time I would not like to say. I know that I cut packing of that description.

Q. What was that steamer Hero?

A. A passenger steamer.

Q. Under what flag was she registered?

A. The Venezuelan flag.

Q. Have you or not to your recollection ever cut down any other packing for use in engines?

A. Yes, sir; I have cut nearly all kinds that I have anything to do with. If it would not fit the box we cut it or stripped it.

Q. How far back have you done that thing?

A. As far back as I know anything about engines.

Q. How far back is that?

A. I guess I did not know much about it before 1863; along there. Of course I was familiar with the business, but did not know much about steam-engines before 1863.

Q. Did you ever have anything to do with packing made of canvas and rubber arranged in various ways beside this Tuck packing and before the year 1874?

A. I can't say that I have. It was all called Tuck, all packing of that description that I have any recollection of.

Cross-examined by Mr. LEE:

Q. What is your age, Mr. Harrison?

A. Forty years.

Q. State when you first had anything to do with steam-engines or machinery using packing.

A. In 1864.

Q. What had been your business prior to 1864?

A. I was an apprentice at the machine business.

51 Q. When did you cease to be an apprentice in the machine business?

A. I ceased to be an apprentice in the early part of 1864; never quite finished my time; I was young.

Q. Whom were you with?

A. The Tredegar Iron Works, at Richmond, Virginia, a portion of the time; it was under the Tredegar Iron Works, not direct, at

their foundry; their place was corner Canal; I forget the name now. Turner owned it, but Tredegar got control of it. I was only there a short time with them.

Q. When did your apprenticeship begin, and with whom?

A. It began with those parties.

Q. Name them—Turners?

A. Yes, sir; it was with Turners, but not the Tredegar Iron Company.

Q. At the time you began?

A. Yes, sir; at the time I began.

Q. At what age did you begin your apprenticeship?

A. I think it was a little past 16 years, along there about.

Q. How came you to leave the Tredegar Iron Works?

A. Because I could not make a living with them.

Q. What was your next employment?

A. I left them and went to the Government works there in Richmond.

Q. What was the nature of these works, what business did they do?

A. It was artillery works.

Q. When did you go to the artillery works?

A. I could not give the dates; those were war times, and I shifted around from one place to another, and finally went into the Confederate navy in 1864.

52 Q. Can you state when you first left the Tredegar Iron Works?

A. No, sir; I would not give you dates.

Q. Was it as early as 1862?

A. I could not give you dates for anything of the kind; I kept no record, no diary; I started to serve my time there, but I could not make a living and left them, and finally went into the Confederate navy.

Q. You went into the Government works, where they had to do with the artillery?

A. Yes, sir.

Q. What next?

A. I don't know; I worked there awhile and shifted around—went to other works—the naval works.

Q. How long were you there?

A. I don't know; I can't tell you the dates or time.

Q. Where were the naval works situated?

A. It was the Ettinger and Edwards machine shop.

Q. In what city?

A. In Richmond; it had come under the control of the Confederate navy department.

Q. What kind of work did you do there?

A. The general run of machine work.

Q. What do you mean by that? Just explain in detail.

A. It is a pretty hard matter to explain that; it is general run of machine-shop work—running machinery and working at the bench, or whatever I was put at.

Q. How long did that last?

A. I could not say; a man who works around like that don't keep any record of the time he works at a place.

Q. After you left this employment what did you do next?

53 A. I think it was immediately after I left them that I went into the navy; I think it was.

Q. Where did you first join the navy?

A. In Richmond.

Q. What vessel did you join?

A. The Richmond, first.

Q. Stationed at Richmond?

A. At what was called the James River squadron—it was part of it.

Q. Where was she?

A. About Drury's Bluff.

Q. What was your first employment?

A. Assistant engineer.

Q. How did you become qualified to become the assistant engineer?

A. By my knowledge that I had gained through the shops.

Q. Was this the first time you had anything to do with steam packing made wholly or partly of rubber?

A. The first time I had anything to do with packing engines I had worked around them at the shop; worked around any engine that was being built or repaired.

Q. It was in 1864, was it, when you first joined this vessel?

A. I think my appointment is dated June, 1864; I think so, sir.

Q. How long were you aboard that vessel?

A. I don't know how long I was on her; I left her as a volunteer for the torpedo service.

Q. Can you state pretty near when that was?

A. I don't know the dates; it was during that year, however.

Q. How large a vessel was the Richmond—what kind?

A. She was an ironclad; I don't remember the size of her—could not tell you hardly, it is so long ago.

54 Q. Do you remember how she was constructed and the principle on which she acted?

A. She was a ram, an ordinary Confederate ram, pitched roof and iron clad.

Q. What kind of iron?

A. Bar iron.

Q. What kind of bars?

A. Flat bars laid on in slabs crosswise.

Q. What was the arrangement of her engine?

A. She had a vertical engine in her. She had the same engine that was said to have been in the old Arctic in Dr. Kane's expedition in the Arctic regions.

Q. Can you describe the construction of the engines?

A. It was a jet-condensing engine.

Q. Do you accurately remember the construction of the engine?

A. I remember the general construction of the engine.

Q. Do you remember its details of construction?
A. No, sir; no one, I guess, would unless they designed it.
Q. What was your next employment after leaving the Richmond?
A. In the torpedo service.
Q. On what vessel?
A. Her name was the Squib.
Q. What were your duties there?
A. Engineer.
Q. How long were you on that torpedo-boat?
A. I don't know that.
Q. Can't you give us any approximate idea?
A. I was there until she was sunk.
Q. When was she sunk?
A. Just after the fall of Fort Fisher.
Q. Who was she sunk by, by those on board?
55 A. I think by those on board. I was off on other duty at that time, sent away, and she was used by the commodore, and I think they sunk her.
Q. Were you temporarily away or had you left?
A. I was temporarily away.
Q. What did you do next?
A. I went back to Richmond.
Q. What was your employment after you got back to Richmond?
A. I went on the Virginia. She was an ironclad.
Q. Where was she stationed?
A. In the James River squadron.
Q. What part?
A. Below Drury's Bluff.
Q. What were your particular duties there?
A. Assistant engineer.
Q. Describe the general construction of that vessel.
A. She was an ironclad similar to the Richmond.
Q. What kind of an engine?
A. A pair of horizontal engines.
Q. Can you describe the construction of the engines with any detail?
A. No, sir.
Q. Can you tell us how long you were on that vessel?
A No, sir. I was there until Admiral Raphael Simmes took charge of the fleet.
Q. Were you there after he took charge?
A. Very shortly until I was transferred.
Q. How long were you there after he took charge?
A. I don't think more than a week. I don't know the date.
Q. What did you do after that? Where did you go?
A. I am not quite sure whether I went to the Hampton or the Roanoke; the Hampton, I think.
Q. What were your duties there?
56 A. Assistant engineer.
Q. Who was the engineer of that vessel?

A. The chief—wait till I think of his name. I ought to know him, because I had a fight with him. I can't call him to mind just at present. West was his name.

Q. His first name?

A. I forget.

Q. How long were you on that vessel?

A. I was on her a very short time.

Q. Can you give us any idea of the time?

A. No, sir; I was transferred at my own request from her to the Roanoke.

Q. Were you on her several weeks?

A. Yes, sir; I was.

Q. Can you describe generally the construction of that vessel—another ironclad?

A. No, sir; she was a wooden steamer—a gun-boat.

Q. Were you the only assistant engineer?

A. There were only two, the chief and myself.

Q. Can you describe in details the construction of the engine of this vessel?

A. Nothing except that she had a pair of horizontal engines, and the propeller was driven from these engines by mitre gearing.

Q. Can you describe any details of her machinery?

A. That is about——

Q. All you remember?

A. Not all; but if I should go into details it would take this young man about two weeks to go through the details of the steamer.

Q. I ask you whether you recollect the details?

A. No; I don't recollect the dimensions, but I can describe it to you on a piece of paper very readily.

Q. What did you do next?

A. I left the Hampton and went to the Roanoke.

Q. How long were you on her?

57 A. Until the fall of Richmond.

Q. How long was that?

A. I don't know how long it was from the time I went on her until the fall of Richmond.

Q. Can you tell approximately?

A. No, sir.

Q. She was another ironclad?

A. No, sir; she was a tug-boat originally, and had been changed into a gun-boat.

Q. What were your duties?

A. Engineer.

Q. Was there any assistant engineer?

A. No, sir; not on her.

Q. You were the only engineer?

A. Yes, sir.

Q. Can you describe the construction of her engines with any detail? Do you recollect the details?

A. She had a vertical engine, two propeller wheels driven by one

vertical engine, side connection; originally built by Harlam & Hollingsworth, of Wilmington. I think her original name was the Loper. It was her name previously to being transferred into a gunboat. She was a tug-boat.

Q. Please state the exact place and time when you first cut up any hose, as you have stated, and used it as a packing.

A. No, sir; I could not tell you the exact time and place, other than what I have heretofore given—1864.

Q. Now, you have spoken of taking a piece of hose, cutting it into strips and using it for packing; what I want to know is under what circumstances and where you first did it?

A. I could not tell you that, under what circumstances and where I first did it. I can only tell you that I did it in that year, and did it because I had to do it.

Q. Did it because you could not get any better packing?

58 A. There was nothing else at the time to suit my purpose as well.

Q. And the fact was that supplies were very difficult to obtain and you had to use your wits to get the best you could?

A. It was a case of necessity.

Q. Can you recollect on what vessel it was that you used a piece of hose in order to stuff a stuffing box?

A. No, sir.

Q. Can you tell how many times it was that you filled a stuffing box with hose or with pieces of hose?

A. No, sir; I did not charge my mind with anything of the kind. I never thought I would ever have any occasion to speak about it.

Q. Do you remember the thickness of the hose?

A. No, sir.

Q. Do you remember whether the hose had a layer of pure gum rubber on the inside as well as outside, or whether it had it on either side?

A. No, sir; I don't remember that. It was ordinary gum hose, such as was in use at that time.

Q. You mean by that, I suppose, the article that is commonly known as gum hose or India-rubber hose?

A. That is what I mean.

Q. Did you ever examine at that time the construction of the cloth of which the hose was composed, so as to tell the exact manner in which the fibres ran. Did you find it out at that time?

A. I never paid any particular attention to it. I only know that it worked better one way than it did another.

Q. Did you pay any attention to the manner in which the hose itself was constructed at that time?

A. No, sir; not at all, except so far as I knew the way the

59 layers of the hose were, but as to the manner in which it was constructed I paid no attention. I knew how the layers of the hose ran when I cut it.

Q. How much did you know about the way the layers ran?

A. All that I saw.

Q. Do you undertake to say positively at this distance of time that that hose was composed of layers of duck that were cut bias in the formation of the hose?

A. Oh, no; I would not say that, because I had to strip the hose to find out. I only know that it would show the ends of the thread. I don't know whether it was bias or not; I won't pretend to say.

Q. Are you sure that you used hose for the purpose of packing a stuffing box more than once on any of those steamers?

A. Oh, yes.

Q. On each of these steamers?

A. I believe I told you some time back that I could not tell which of them, or when or where.

Q. Did you use a piece of hose, as you have stated more than once, on any one steamer?

A. I should think that I did, for I packed them more than once.

Q. Are not the facts in relation to the packing used on these steamers substantially this: That as you could not get proper, well-made packing on account of its being very difficult to obtain proper supplies, you used anything that came to hand for the purpose of supplying the place, without paying any particular attention to the details of construction of the packing that you used or its mode of manufacture?

A. We used whatever we could get, and that which would give us the best results.

Q. Without paying any particular attention to the mode in which the material was made? Did you trouble yourself to find
60 out particularly how this hose or other material was originally manufactured?

Objected to as incompetent.

A. Not at all. All we desired was the gum hose if we could get it.

Q. How many times did you make up this packing composed of a compound of lamp wick and sheet gum and strips of hose?

A. My dear friend, I never kept a diary of the movements that I made when I was in that business.

Q. Did you apply such a combination to a stuffing box more than once—that is, the lamp wick, the pure gum, and the strips of hose?

A. Yes, sir.

Q. More than once?

A. Yes, sir.

Q. On what steamer?

A. I could not answer you on what steamer I applied it more than once. I believe I have answered that more than once.

Q. No; I ask you about this particular thing.

A. I say I have used it more than once; on what particular steamer I could not say.

Q. Can you give the name of any other person that assisted you in using it?

A. No; I paid no attention to what any one else did but myself.

Redirect:

Q. I understood you to say in answer to a question that the hose when you used it as a packing worked better one way than it did another. Explain what you mean by that answer.

A. When the ends of the threads were presented to the wearing surface it seemed to give a better result—that is, the packing did not wear out so soon.

61 Q. Is that the only difference?

A. About the only difference. Of course, if it did not wear out so soon it kept tighter longer.

Q. You say, in answer to another question of Mr. Lee's, that when you used the hose in that way the ends of the threads showed. That was about all you knew of the construction of it. Now, look upon the piece of hose marked "B" and state whether or not it has the appearance you referred to.

Objected to as leading.

A. That has the general appearance of any hose that ever I saw cut.

Recross:

Q. You stated that you observed that one kind of packing that you have just spoken of was better than the other. How many times did you make tests which led you to that result?

A. I could not answer that.

Q. More than once?

A. Yes; frequently. It has been gotten in and did not give good result, and we blew it out, and we found that it hadn't been put in as we usually put it in. We packed the box.

Q. Can you state on which of these vessels you used it any other way?

A. No, sir.

Q. Did you ever use it more than once with the ends of the thread on the wearing surface?

A. That was the way I aimed to use it at all times.

Q. Did you ever actually so use it more than once? Can you state positively?

A. Yes, sir.

Q. But you can't state on what vessel?

A. Not what particular one of those—on all.

62 Q. Did you ever use it the other way more than once?

A. Not if I knew it, I did not.

WM. F. HARRISON.

Sworn and subscribed before me this 12th day of January, 1885.

LEWIS W. SCOTT, *Examiner.*

WILLIAM W. SMITH, a witness produced on the part of the defendants, being duly sworn according to law, testified as follows:

Direct examination by Mr. LOWTHORP:

Q. Please state your name, and occupation, and residence.

A. My name I have given, William W. Smith; residence, Philadelphia; occupation, engineer and machinist.

Q. Where were you during the years 1861 and 1865?

A. From 1861 until the fall of 1862 I was in the army, after which I was in Newark until the fall of 1863, when I went into the navy as assistant engineer until the close of the war, in May, 1865.

Q. Were you in active service during the years you were connected with the navy?

A. Yes, sir.

Q. What was your occupation during that service?

A. Assistant engineer.

Q. On what vessel did you serve?

A. On the United States sloop-of-war Canandaigua and the monitor Sangamon.

63 Q. Were you in charge of the engines of those vessels?

A. I was part of the time; yes, sir; during my regular watch.

Q. Did you during that time have occasion to use any packing?

A. Yes, sir.

Q. What packing did you use?

A. Used mostly Tuck's packing when we had it handy and convenient; if not, we used other expedients that we could get hold of.

Q. What was this Tuck's packing, that you speak of, like?

A. It was composed of gum and canvas.

Q. How arranged?

A. I think the gum was in the centre and the canvas wrapped around it, or woven around it. I am not sure which.

Q. Was there any other rubber in it besides the strip of gum that you speak of?

A. Not that I remember of.

Q. (The drawing in Tuck's English patent No. 1865, before referred to, being shown to witness.) State your general experience as an engineer, so far as it relates to the construction of engines and machinery and matters pertaining thereto. Give us a general idea.

The exhibition of the drawing to witness is objected to as an attempt to lead him.

A. My first experience in engineering was running a stationary engine in a saw-mill, in 1857 and 1858, or 1856 and '7, I should say. Then I went into the machine shop at Seneca Falls, N. Y., and learned the trade of machinist, working on steam fire-engines at Silsbee & Mander's. They made a piston engine there under the direction of Mr. Clapp. I worked on that the latter part of the

64 time; passed the examination before the board of engineers at the Philadelphia navy yard, in the fall of 1863, and was appointed acting assistant engineer. I remained until the close of the

war. Since then I have been in the general machine business, repairing engines, building engines; carry on a shop now for that purpose, as well as for other purposes.

Q. In your work in that line have you had occasion to personally examine mechanical drawings?

A. I have, frequently.

Q. Is or is not the work in your shop ever done under your direction and from mechanical drawings?

A. It is, frequently.

Q. Now, just look at those drawings there and state what you understand them to be.

A. I understand them to be drawings of a packing with rubber and cotton fibre, I should suppose, or hemp.

Q. What sort of a view is that?

A. End view.

Q. Do you ever remember using any packing that in any way resembles any of those?

A. Yes, sir.

Q. Please state what.

A. Figures 1, 2, 7, and 9, I think.

Q. Please describe the packing which you have used and which you say resembles No. 9.

A. No. 9, it had the rubber backing to it, to the best of my recollection, with a cotton face, which was wound similarly to this shown in the cut.

Q. What do you understand to be represented by these lines at angles to each other on that drawing No. 9?

A. I should take them to be the cotton canvas wound around it, and this the rubber backing.

Q. Where did you ever use packing of that character represented in No. 9?

A. We used it aboard ship.

Q. What ship?

65 A. Canandaigua.

Q. When did you use that?

A. In 1864.

Q. Where was the Canandaigua at that time?

A. In the South Atlantic blockading squadron.

Q. Was she at any particular place that you remember?

A. Along the coast from Winyow Bay, S. C., and as far south as St. John, Fla.

Q. Were you in any ports?

A. Beaufort.

Q. Beaufort, N. C.?

A. No; not Beaufort—let's see, in South Carolina.

By the examiner:

Q. Port Royal?

A. Yes, sir; that is the place.

Further direct:

Q. Any other place?

A. That was the only place where we went in for repairs and coaling.

Q. How did you use that packing?

A. Used to wind it round the piston rod in sufficient quantity, if we could get it in; in some cases where it was too large we would cut off one side of it, then insert it.

Q. What side would you cut off?

A. The canvas side in the packing, with the gum in the center; sometimes we cut it off this way, one side, so as to get it in the stuffing box; and this flat packing we would cut off here in some places.

Q. How would you cut off the packing shown in figure 9?

A. We would cut it off on this canvas side here; take it off here, leaving the gum intact.

Q. Then, after cutting it off so, how would you use it?

66 A. We could put the canvas side toward the rod that we wished to pack, leaving the gum outside for a backing.

Q. When it was placed in this way what would be the position of the layers or plies of canvas or cotton duck relatively to the wearing surface?

A. Most of them would have the edge of the canvas against the rod to be packed.

Q. What was your object in leaving the rubber core intact?

A. For a spring to keep it up against the rod; the elasticity in it.

Q. Would that take up the wear?

A. Yes, sir; a portion of it. If there was any irregularity in the rod it would give so as to accommodate itself to the sides of it.

Q. Did you state what year you used that in?

A. In 1864 or 1865; I won't be certain.

Q. It was during the time you were in the service?

A. Yes, sir.

Q. And you remember that it was in use at the particular places you stated?

A. Yes, sir.

Q. Did you ever use any of this aboard the monitor Sangamon?

A. Yes, sir.

Q. At what place was the Sangamon when you used that on her?

A. Lying in Charleston and up the James river.

Q. Did you ever use any other sort of packing?

A. Yes, sir; we had some expedients. When we did not have Tuck's packing sometimes we used hemp packing; sometimes hose—a piece of rubber hose—cutting it up into strips, when we could get it.

Q. When you cut rubber hose into strips how would you cut and use it?

A. Cut it into strips lengthwise; put the edge of the cut

67 against the rod. Sometimes we have used hemp in between. Cut off a strip of hose and then put in hemp, and after strips of hose, and some more hemp, filling it up in that way.

Q. Was this hemp that you put in exposed to the wearing surface
A. Yes, sir.
Q. Would you use this hose and hemp with or without anything else?
A. No, sir; not that I remember of.
Q. My question was: Would you use this hose and hemp with or without anything else?
A. We did use it without anything else; alternate layers of hose and hemp.
Q. Was the hose and hemp always arranged in particular ways, as specified?
A. That is the way I would use it.
Q. (Strip marked "B" shown witness.) Please state how the hose which you say you cut into strips resembled or differed from the piece you have just referred to.

Objected to as leading.

A. It is substantially the same.
Q. Where did you ever use hose cut into strips in the way you mention?
A. Off of Charleston; in the Sangamon.
Q. When was that?
A. It was in March, 1865. No, it was in February, 1865. I think Charleston was evacuated on the 22d of February.
Q. Did you use it anywhere else?
A. I was aboard the Sangamon but a short time before that; probably four weeks. I know we were short of supplies there and had to use anything we could get for packing.
Q. Did you always cut your strips of hose of a width which would just fill the space between the rod and the back of the box?
A. As near as we could. We cut it to fit as near as we could, and it would slip in.
68 Q. Did you ever make a slight miscut, and make a strip rather too narrow to fill the space?
A. Yes, sir; I have.
Q. What did you do in such case?
A. We depended upon forcing it in there and filling it up with the gland of the stuffing box.
Q. Do you remember whether the packing which you cut down had layers of duck fastened together in any way or were they loose?
A. I think they were stuck together; I am not positive about that; it is so long ago I do not clearly remember how it was in regard to that.
Q. That is all.

Cross-examination by Mr. LEE:

Q. Who made this Tuck packing?
A. I don't know, sir.
Q. Did you know at that time?
A. No, sir.

Q. Was there any mark upon it showing the manufacturer's name?

A. Not that I ever noticed. It was furnished us by a requisition on the naval stores at Hilton Head.

Q. Did you get all of it at Hilton Head?

A. I mean Port Royal.

Q. All that you have spoken of?

A. I think that we got it also at the navy yard at Norfolk.

Q. Then all you got during the period was got by requisition at Port Royal and the Norfolk navy yard?

A. Yes, sir.

Q. What was your object in cutting this Tuck packing?

A. To reduce the size.

Q. Why did you not use a piece of the proper size?

A. We did not always have it.

Q. You cut it in this way when you could not help it?

69 A. Yes, sir.

Q. Then if you had the proper size you used it and let it go?

A. Yes, sir.

Q. And if you did not have a piece that would answer the purpose you were forced to cut this Tuck packing down?

A. Yes, sir.

Q. Can you state on what steamer you first cut down any Tuck's packing and put it in stuffing boxes?

A. On the Canandaigua.

Q. Under what circumstances?

A. When the packing was too large to go into the stuffing box.

Q. Did you cut it yourself?

A. Yes, sir.

Q. How did you cut it down—with what sort of an instrument?

A. A knife.

Q. Do you remember on the first occasion whether this packing was round packing or square packing, or how it was shaped the first time you ever adopted that expedient?

A. I think it was——

Q. Can you remember positively?

A. No, sir.

Q. Can you remember positively whether you ever cut down any square Tuck's packing?

A. I think I have; yes, sir.

Q. Can you be positive on the subject?

A. To the best of my recollection I have cut square packing; we used more square than round; there was very little round used by us.

Q. My question is whether you are positively certain at this distance of time whether you ever cut down any square Tuck's packing, so called.

A. I think that I can state quite positively that I have.

70 Q. Are you actually sure at this distance of time or are you in doubt about it?

A. No; I have no doubt about it.
Q. You are absolutely certain?
A. I am certain that I have cut square packing.
Q. Are you certain that you have ever cut any square packing down where the rubber core was away from the center of the packing?
A. Not square packing, but I have had the flat.
Q. What do you call the flat packing?
A. Similar to that No. 9 I call flat packing. That I recognize, and these, too—1, 2, 7, and 9.
Q. Do you call figure 1 round or square packing?
A. Square packing, and figure 2 is round.
Q. And what do you call 8 and 9?
A. Flat packing.
Q. Can you be positive that you have cut the canvas or fibre part off any packing like figure 9, and put it in the stuffing box?
A. Yes, sir.
Q. On either of these steamers?
A. I have.
Q. When did you first do it, and on what steamer?
A. I know we did it on the Sangamon, and I think on the Canandaigua.
Q. How many times did you do it on the Sangamon?
A. I could not say.
Q. Did you do it more than once?
A. Several times.
Q. Did you do it twice?
A. Yes, sir.
Q. Did you do it three times?
A. I presume I did.
Q. Did you do it more than three times?
A. I think I did.
Q. Did you do it five times?
71 A. Yes, sir; several times. That was something we often had to do.
Q. In speaking of the use of hose you say you have taken pieces of hose to pack stuffing boxes with?
A. Yes, sir.
Q. Do you know whether that hose had any pure or elastic gum on the outside or inside of it?
A. It is like ordinary steam-hose—gum inside and outside.
Q. It was the kind that had gum inside and outside, and not what is known as rubber hose, with plies of canvas and ordinary friction coating on it?
A. It had a layer of gum inside and a coat of gum outside.
Q. You are familiar, are you not, with the ordinary coat of India rubber known as friction coat?
A. Not by that name; no, sir.
Q. How thick a layer of gum was there on either side of this hose?

A. I think the gum on the outside would be, perhaps, a sixteenth of an inch thick. The inside would be simply a covering.

Q. Simply spread over it?

A. Yes, sir.

Q. Are you sure that the outside had nothing more than the ordinary layer spread over it?

A. The outside layer was the thickest, in my recollection.

Q. When you cut this hose did you examine the mode in which the thread ran of the fibre material, whatever it was?

A. Not particularly.

Q. Now, on the first occasion on which you cut down any packing like figure 9, of which you have spoken, can you state with accuracy how far down you had to cut in order to make it fit the stuffing box on the first occasion?

A. No, sir; I cannot.

Q. Can you on the second occasion?

72 A. No, sir; I can't recollect how much we took off; I know we cut it down.

Q. You cut it off enough to get it in?

A. Yes, sir.

Q. And you can't remember how much you had to cut off in order to get it in?

A. No, sir.

Q. Have you any accurate recollection of the exact amount you had to cut off in order to get it in?

A. No, sir.

Q. Have you already stated as accurately as you can how much you cut off in order to get it into the stuffing box when you used something like figure 9?

A. I could not say positively how much we cut off, but I know we cut it off in order to get it in the stuffing box; reduced the size of it.

Q. Are you positive that you had to perform this operation as many as half a dozen times?

A. Yes, sir.

Q. As many as ten times?

A. I won't say.

Q. As many as eight times?

A. I won't say.

Q. Seven times?

A. I said that I could not tell how many times, but I know it is a frequent occurrence—quite frequent.

Q. How many times did you have occasion to cut down packing like figure 1?

A. I could not say how many times.

Q. More than once?

A. Yes, sir.

Q. More than half a dozen times?

A. I presume so.

Q. Are you sure that you did as many as half a dozen times?

A. I would not be afraid to say that I did.

73 Q. Can you remember how far you cut it down approximately?

A. Sometimes a third of it off.

Q. That is, one-third way from the outside to the core?

A. Yes, sir; maybe half the distance from the outside to the core.

Q. How about No. 2 round packing? How many times did you cut that?

A. Never cut that. We used very little of it.

Q. How about figure 7? How often did you have occasion to cut that?

A. I could not say.

Q. Do you think that you ever cut any of it?

A. I am not positive that I did. I don't think I ever cut any of figure 7.

Q. Then you are not certain that you ever cut any of figure 2, but you are certain that you cut figures 1 and 9?

A. Yes, sir; I am certain about figures 1 and 9. We used very little of the round packing.

Q. And figure 7, you don't think you ever cut any?

A. No, sir.

Q. And figure 9 you did?

A. Yes, sir.

Q. Are you willing to swear positively that the Government of the United States during the war of the rebellion at any time used packing like that shown in figures 8 and 9 that was based wholly or partly on vulcanized rubber?

A. Figure 8—I did not recognize figure 8 at all.

Q. Figure 9, then?

A. To the best of my recollection, we did, figures 7 and 9.

Q. Are you positive that that was true during the war of the rebellion at any time, the same being composed wholly or partly of vulcanized rubber made under Goodyear's patent?

74 The question is objected to so far as it relates to any particular patent under which it was made.

A. To the best of my recollection we did. I don't know what patent it was made under.

Q. Do you know what is meant by vulcanized rubber?

A. Vulcanized rubber, as I understand it, is rubber that has been subjected to heat for the purpose of hardening it, making it very firm. It goes through some chemical process; I don't know what.

Q. This packing that you have spoken of as figures 7 and 9 contained vulcanized rubber, didn't it?

A. I should think it did.

Q. Don't you know that it did.

A. Yes, sir.

Q. Was it not well known to you at that time who was the inventor of vulcanized rubber?

A. No, sir.

Q. It was not known to you?

A. No, sir.
Q. Was it not a matter of general public knowledge?
A. We all supposed that Goodyear was the inventor.
Q. Was it not generally known as Goodyear's vulcanized rubber?
A. I never heard of any other patent upon vulcanized rubber except Goodyear's.
Q. Have you any knowledge whatever of the origin of this packing that was used on board of the vessels of which you have spoken?
A. Tuck's patent; no, sir; none at all.
Q. Either by marks upon it or otherwise?
A. No, sir.

Q. You have not yet directly answered my question as to
75 whether you are positively certain that packing like figure 7 and figure 9 were used by the United States Government in the navy in the years 1863, '4, and '5, or any of them?
A. I have given you the only answer I can give.
Q. Then you are not willing to say positively that such packing as represented by figures 7 and 9 were used in the United States States Navy in the years 1863, 1864, and 1865, or any of those years; is that not true?
A. I would not say positively, but to the best of my recollection we did have it.
Q. That is all?
A. I have not thought about this subject at all, nor even posted myself at all, nor referred to any old papers that I have. I came here quite unexpectedly to-day.

Redirect:

The certified copy of Tuck's English patent No. 1865, dated August 25th, 1854, filed in evidence, and the same is marked "Defendant's Exhibit Tuck's English Patent."

Q. (Said exhibit being shown to witness.) Please show by a mark upon figure 9 where you cut the packing down, as you stated you did?
A. All I can do will be to approximate as near as my recollection will permit.
Q. Draw a good strong line across and outside of it and mark it X X; an X at each end.

The witness thereupon drew a line across the packing, which was marked with an X at each end.

Recross:

Q. When you used to cut up strips of hose, how came you to use them—because you could not do better?
76 A. Because we could not do better. We were out of Tuck's packing and used it as a substitute.

Further redirect:

Q. When you used that hose cut in strips in what direction did

the threads in the plies of duck run relatively to the wearing surface—the rod?

A. Must run bias. The canvas being wound around it would leave the fibre bias to the line of the cutting.

Q. Would that expose to the wearing surface the ends or the sides of the threads?

A. The ends of the threads?

Recross:

Q. How do you know that the hose that you used at that time was so wound that when it was cut by you it was cut bias?

A. Because the canvas was wound spirally around the hose, according to my recollection of it.

Q. Do you not know that a very large proportion of the hose that has been made by rubber manufacturers for the past twenty years has been made so that it is not spiral, but straight?

A. Yes, sir; I know that some of it has.

Q. Did you take such particular notice of this particular hose that you used on these steamers on these occasional emergencies, so that you can say at this distance of time whether it was hose that was made in the one way or the other?

A. Yes, sir.

Q. How came you to take such particular notice?

A. I know from the difficulty in cutting that we used to experience cutting across the threads instead of following the threads—the difficulty to cut straight.

Q. How many times did you cut in such hose for the purpose of packing a stuffing box?

A. I could not say.

77 Q. More than once?

A. Yes, sir.

Q. More than once on each steamer?

A. Yes, sir; I don't say that we used it on the Canandaigua. I don't remember it there.

Q. On what steamer do you remember that you did use it?

A. Sangamon.

Q. Did you use it more than once on the Sangamon?

A. Yes, sir.

Q. More than twice?

A. Yes, sir.

Q. More than three times?

A. Yes, sir,

Q. More than half a dozen times?

A. I presume so.

Q. That is, as far as you are willing to be positive about it?

A. Yes, sir.

The further examination was adjourned at this point to Wednesday, the 14th day of January, 1885.

WM. M. SMITH.

Sworn to and subscribed before me this fourteenth day of January, A. D. 1885.

LEWIS W. SCOTT, *Examiner.*

78 United States Circuit Court, District of New Jersey.

NEW YORK BELTING AND PACKING COMPANY, Complainant, and ALLEN MAGOWAN and Others, Defendants. } In Equity.

Continuation of case pursuant to adjournment.

Testimony taken on the 14th day of January, 1885, at the office of S. Lloyd Wiegand, Esq., 146 South 6th street, Philadelphia, Pa.

Appearances as heretofore.

JAMES S. LEVER, a witness called and sworn according to law on behalf of the defendants, deposeth as follows:

Direct examination by Mr. LOWTHORP:

Q. Mr. Lever, will you please state your name, age, residence, and occupation?

A. I am a good deal of an old maid; I don't like to tell my age. Well, I am fifty-nine years old—over.

Q. Where do you reside?

A. At 1907 North 11th street.

Q. What is your occupation?

A. Book-binder.

Q. How long have you been engaged in the business of book-binding?

A. Well—altogether?

79 Q. How far back?

A. About forty years.

Q. How many?

A. About forty years.

Q. About forty years. Have you had occasion to use steam-engines?

A. Yes, sir.

Q. Have you had any occasion in your business in book-binding?

A. Yes, sir.

Q. How long have you used steam-engines in connection with your business?

A. How long?

Q. Just state generally.

A. Well, I think about twenty-five years.

Q. Have you ever had any care or oversight of those engines yourself?

A. Yes, sir; I took care of the engine myself.

Q. Are you familiar at all with steam-packings as used on engines?

A. Well, yes; I am, to a certain extent. Of course, I cannot say that I am altogether authority on that.

Q. How did you come to be familiar with steam-packings of that kind—by use?

A. By having had to pack the engine myself.

Q. You have, then, packed them yourself?

A. Oh, many times.

Q. What have you had occasion to use as packing when you packed them yourself?

A. Well, I have used various kinds of packings—gum packings. I have used what you call soapstone packings and hemp packings.

Q. You say gum packings. What kind of gum packings have you used? Can you describe them?

A. The gum packings that I used was, as it were, a sheet of gum and a sheet of duck fastened together and altogether making several alternate thicknesses of it.

80 Q. You say a sheet of duck was used in packing. Please state what shape that duck was in.

A. Well, we used to buy it in a sheet.

Q. The duck?

A. The packing already.

Q. Can you give us any idea of the form of it?

A. I cannot say that I can describe it very fully; what I know about it is—there was a sheet of duck and a sheet of gum, a sheet of duck and a sheet of gum, alternating in that way. We used to cut it up in strips and wrap it around the piston to make the packing.

Q. This sheet of gum which was between the sheets or plies of duck, were they thick or thin?

A. Well, you could buy almost in any way you wanted it. I used to use it.

Q. Did you ever use anything else to pack your engines with?

A. What, at the time I was using that?

Q. At any time.

A. Oh, yes; I have used the soapstone packing.

Q. I mean aside from what you have mentioned.

A. I have packed them with gum, just as I say—composition of gum and duck and soapstone—and I have packed them with hemp and lamp wick.

Q. Did you ever get up any particular gum packing of your own outside of what you bought already made?

A. Well, I have at times used what they call this gum hose, and wrapped them around and then put on a strip of canvas on the inside of it.

Q. What kind of gum hose would you use?

A. Well, something similar to what they use for fire-hose at the present time.

Q. Do you know of what materials that is made?

A. Nothing more than I have heard it called gutta-percha. Some call it gum, some gutta-percha; some call it one thing, and some another.

Q. Is it made entirely of gum, or is there anything else in the arrangement of its construction?

81 A. There was cotton in it.

Q. In what form was that cotton—simply in thread or cloth, or how?

A. If I mistake not it was in cloth; but it is so long ago that I really do not fully know what it was.

Q. State how you used that hose. Did you put regular sections of hose in, or how?

A. I would cut it up in the strips the width I wanted, and then wrap it around.

Q. You cut these lengthwise or crosswise to the section of the hose?

A. Lengthwise. I cut them off as I wanted them and then bevel the ends off of them, so that there would not be any openings, or the steam would leak through, and to make even packings.

"B" being shown witness, he is asked:

Q. What is that; can you tell?

Objected to as leading.

A. That is what we call gum packing.

Q. Does it bear any resemblance to any packing you have used?

A. Let me see that again, please.

Sample handed to witness.

Well, you take off this piece of gum on the outside and it does resemble it very much.

Q. What kind of packing does that resemble with the thick piece of gum removed?

A. The packing we used to buy in the gum stores on Chestnut street.

Q. How long ago was that?

A. Well, I cannot give the date exactly how far back it was; but about at the breaking out of the war—probably a little before

82 the breaking out of the war—say probably in 1860 or 1861, somewhere along there.

Q. When you cut the hose into strips and used it as packing did or not the strips so cut in anywise resemble or differ from the article which you hold in your hand, marked "B;" and if they resembled in what respects did they resemble, and if they differed in what respects did they differ from it?

A. The hose that I cut up for that purpose was technically called a garden hose—this small hose for watering streets or sprinkling gardens, and things of that kind, which was made up, having a strip of cotton webbing or apparently that kind, and then gum on the outside, and the hose that I had at that time was called what we call double hose—that is to say, it was made double; it had two sections of gum and I would wrap that around until I got the thickness required.

Q. Mr. Lever, you say that hose had two sections of cotton and gum, meaning by that, I presume, plies?

A. Yes; you may call them plies.

Q. Did it have one ply of gum on the outside?

A. Yes; it was called gum hose.

Q. Did it have any ply of gum on the inside?.

A. Yes.

Q. Between the two plies of duck?

A. Yes, sir; there was a thin film of it.

Q. (Article shown witness and marked by examiner "E" for identification, — is asked:) Can you illustrate by means of that article the form in which you made this or used this packing made of strips of hose?

Objected to as leading.

A. (Witness illustrating:) That is something of the style in which they were put in.

83 Witness takes the strip, bends it into a circle, and places two of these ends so that they lap over each other.

WITNESS: We generally would roll them around in a spiral, so as to form two layers, one above the other—two or more layers, one above the other.

Q. I noticed, as you bent this strip, that the plies of duck and layers of gum in it are placed edgewise, towards each other and towards what I understand to be the wearing surface of the rod; am I correct in that?

A. Yes, sir; you are correct in that.

Q. On examining "E," can you tell what that is—what it is made of?

A. Nothing more than from its appearance; it seems to me to be made of what is called gum and ducking, or a cotton cloth.

Q. Did I understand you to say before that the article itself resembled the strip of hose which you cut, or that you simply cut strips of hose and wound them in the manner which you say?

A. I simply cut the strips of hose and wound them around the piston rod, as I wound them around my finger, and we cut them in that way to give it the set.

Q. Now, Mr. Lever, when you wrap it in that way, as I understand, the edges of the plies of duck bear vertically against the wearing surface; am I correct?

A. The same as though it was this edge bearing against the piston rod, like my finger is now.

Witness winding it around his finger so that the inner edges of the plies of duck and rubber bear against his finger.

Q. Your finger represents the rod, does it?

A. Yes; my finger would represent the rod.

84 Q. Can you remember, Mr. Lever, whether, in these strips of hose which you cut and used in that way, the ends of the

threads composing the cotton fabric or duck were exposed to view, or were the lengths of the threads exposed to view?

A. The threads would be exposed to view only upon cutting up the hose. It didn't show the threads when the hose was in a piece. As a matter of fact it would be where you cut the hose, and we wrap that edgeway around the piston.

Q. Can you state on looking at the inner edge of this Exhibit "E" whether the layers of duck as exposed to view resemble that or not, and if they resemble in what respect do they resemble, and if they differ in what respect do they differ—that is, in general appearance?

Objected to as leading.

Q. I want to know whether it looked like that after it was cut?

A. It looked very much like that after being cut.

Q. Did you, Mr. Lever, use this packing made of hose, cut and wound as you have described and as you have shown in this piece marked "E," use it alone or in combination with any other packing or material?

A. I most generally used it alone. I have used it, though, by making it, as it were, a gasket of it and winding it around with lamp wick.

Q. What is your object in winding it around with lamp wick?

A. Well, I thought it wore better.

Q. You say you generally used it without anything else?

A. I did for quite a time. Sometimes I would do it one way and sometimes the other, but most generally I done it without using lamp wick, because it took much longer to do it.

Q. Did you ever use anything except this?

85 A. I don't think I did, although it is so long ago I would not be very positive about it just now.

Q. Hold that in your hand and tell me, please, whether you used that, as you described, by winding it spirally in the stuffing box and whether you never used anything but lamp wick.

A. I don't think that I ever did.

Q. Did you always cut it of a sufficient thickness to fill the stuffing box close?

A. I would cut it to make what I would call an easy fit.

Q. Now, Mr. Lever, I hand you an article which is marked by the examiner for identification "F" and ask you if you can tell me what that is?

A. That is what we used to call gum packing.

Q. You have stated in your answer to a previous question that you have in your business in packing engines used gum packing. Is that the kind of packing you refer to or not?

Objected to as leading, especially to the exhibition of the article to the witness.

A. I have used packing similar to that, but when I would use that I would wrap the piston rod first with lamp wick and put some of this on the outside over the lamp wick, and then pressed it in.

Q. When you have used such packing as that in connection with lamp wick, and when you have wrapped that over the outside, what would be the position of the lamp-wick part of the packing respectively to the rod or wearing surface?

A. The lamp wick would be next to the rod.

Q. Then where would the gum be?

A. It would be on the outside of that, between that and outside of the stuffing box.

86 Q. Did you ever use anything else in combination or in connection with strips of gum like that besides lamp wick?

A. I don't think that I did.

Q. When did you ever use the strips of hose cut and placed in spiral coils, as you have described, as a packing?

A. I could not give you the date further than this: I remember it was about the breaking out of the rebellion. I ceased running the engine and turned it over to another party, but it was prior to the breaking out of the war.

Q. You know it was prior to the breaking out of the war?

A. Oh, yes.

Q. When, to the best of your recollection, did you ever use the lamp wick with this gum packing, as you have described?

A. Well, as near as I can tell, it is something like, probably, 1860, or somewhere along there.

Q. Where did you use that, Mr. Lever?

A. On the engine that I had, No. 48 North 7th street.

Q. In this city?

A. Yes, sir.

Q. Where did you ever use the sections of hose as a packing in the manner described by you, wound spirally around the piston rod?

A. At that same place.

Q. When?

A. That is one of the questions that I cannot answer, to date; I ran the engine probably for two or three years, but I could not give you the dates of it now.

Q. Well, was it ten years ago?

A. Yes; twenty years ago and over.

Q. That would make it '64, wouldn't it?

A. A little before that.

Q. Before 1864—how did you come by your engine?

A. Purchasing it.

87 Q. Of whom did you purchase it?

A. The first engine that I ran I purchased of—I cannot remember the name now; let us see; he was a second-hand dealer in engines.

Q. I infer from your answer that you have used more than one engine?

A. Yes, sir; I have used half a dozen of them.

Q. Where did you purchase the second, and from whom?

A. I think, if I mistake not, it was purchased from Mr. Wiegand.

Q. Wie?

A. No; Weigand.

Q. It is on the door there Wiegand.

A. So it is; it is the gentleman I saw here a few minutes.

Q. Do you remember when you bought that engine?

A. Well, it was some time, probably, in 1863 or somewhere along there. I think it was, but I am not positive about the dates.

Q. Did you use on that engine the packings made of strips of hose which you have described or not?

A. I did.

Q. Do you remember whether you used the packings made of lamp wick and gum that you have described on that engine?

A. I did.

Cross-examined by Mr. LEE:

Q. When did you last carefully examine a piece of packing of any kind?

A. Well, I have used it off and on until within the last three years.

Q. Have you used it personally all that time?

A. Yes, sir.

Q. In connection with what duties?

88 A. In keeping the engine in working order. The engine was used to give us the power in the book-bindery.

Q. Did you take charge of the engine?

A. I am renting power at the present time.

Q. When last did you take charge of an engine?

A. Up to August, two years ago; two years and a half ago.

Q. Did you have an engineer to run the engine?

A. I did.

Q. All the time?

A. I superintended it generally myself; I may say I run the engine; I attended to the starting and stopping and keeping it in repair and probably, in my absence, parties kept the steam up and saw that the fire didn't get down; we didn't require an engineer, really.

Q. Were you accustomed to packing engines yourself?

A. Yes, sir.

Q. That is within the last ten years. From January, 1875, what portion of the time have you ran an engine?

A. Personally, myself?

Q. Personally, yourself.

A. Well, since 1875 I cannot say I ran it personally. I would have another person, but when it come to packing, or anything of that kind, I always attended to it myself.

Q. Did you always help to pack it yourself up to that time?

A. I was always there to see that packing was put in.

Q. Has your knowledge of the construction of various kinds of packing been close and accurate, or have you simply used such as you have bought, as a general rule?

A. Sometimes such as anybody else would use; sometimes improvised for myself.

Q. All your use of engines has been confined to the city of Philadelphia?

89 A. All my own engines have been here; yes; I was raised here—you call it Philadelphia—out in Frankfort; that is some four or five miles. I used to, when a lad, assist my father in packing the engine. My father was an engineer.

Q. How many horse-power was the engine that you last had, and who made it?

A. The last engine I had was nominally six-horse engine, made by Whitberham.

Q. Will you state the same facts with regard to each previous engine that you have managed or had charge of personally and state, also, the time when you purchased or took charge of each engine?

A. So far as any date is concerned, I cannot give it exactly. I have not charged my mind with this thing at all.

Q. State the facts as near as you can, if you can state them with any accuracy.

A. Well, I cannot; I know it is a long time ago.

Q. Is it a long time ago since you purchased or procured the engine or took charge of the engine which immediately preceded the last one which you had charge of?

A. I think that I gave up the use of the next to the last engine in, probably, 1864 or 1865; somewhere thereabouts. I could not tell the exact date.

Q. Then you had the same engine from 1864 down to about three years ago?

A. About 1865—'64 or '65—until I sold it, some two years and a half ago or thereabouts.

Q. You know the specimens of what you have called gum packing, composed partly of gum and partly of canvas; can you describe exactly how the cloth was woven or how the threads ran?

A. I could not describe it exactly, because I never took any particular interest in it.

90 Q. You have referred to some specimens that have been shown to you in the course of your examination as resembling what you used in former years. Will you undertake to say that what you used in former years was exactly like these specimens in regard to all the details?

A. There was a similarity—no, sir; I would not say they were exactly the same.

Q. All you mean to say is that they were similar in appearance?

A. Yes; that they were similar in appearance.

Q. And that is the extent to which your memory will allow you to go?

A. That is as far as I can state on that—the appearance is very much the same.

Q. How came you to be obliged to cut up hose and resort to other means and expedients to pack the engine when you were in Philadelphia?

A. Simply because I had it handy.

Q. Is there any packing—that is, what you call gum packing—for

sale in the stores at Philadelphia, and has it not been for sale ever since you can remember?

A. Well, it has been for a long time; I won't say as long as I can remember, for I hardly think it was.

Q. It has been in the stores for over thirty years back, has it not?

A. That I would not say.

Q. Well, for more than twenty-five years back?

A. Well, I should say it had.

Q. Well, why didn't you purchase it in the stores instead of improvising it, as you have stated?

A. For the simple reason that I used so little of it and they would not sell small quantities of it without putting the tariff on pretty high.

Q. Then you used such small quantities of it that you thought it would be cheaper to use up garden hose?

A. Things of that kind.

91 Q. Garden hose was also sold by the same dealers?

A. Yes; I just used an old garden hose that I had no further use for, and I took it to the shop from my house and I cut it up and used it for various purposes.

Q. How long is this hose that you cut up?

A. That is asking more than I can remember; I think I had forty feet of it, in the first place.

Q. What was the diameter of the hose?

A. I could not say exactly.

Q. An inch, a quarter of an inch, inch and a half? Give the best measurement you can.

A. I suppose about an inch and a quarter; somewhere thereabouts.

Q. How many such pieces of hose did you use in any way to cut up?

A. I could not answer that.

Q. How much of this forty feet of hose did you use for packing the engine, and how much did you use for other purposes before you destroyed it?

A. Well, really, I could not answer that question, for I don't know positively.

Q. Did you ever on more than one occasion pack the engine with hose or strips of hose?

A. I did; I did on several occasions.

Q. All cut off from this same piece of old hose?

A. Yes; we also used packing which we bought in the stores; what we call facings; it is from the embossing presses to keep the steam in.

Q. Please mention the different stores from which you bought packing at any time prior to 1869.

A. Well, I don't know that I bought any from the stores—that is to say, the packing. Yes; I used to buy it here on Chestnut, on the north side; it is called Goodyear's packing; I forget the firm's name I bought it of.

Q. Well, between what streets?

92 A. I think between Third and Fourth.

Q. Well, was not that the store of the New York Belting and Packing Company, known by the name of Goodyear's?

A. Goodyear's is on one side of the street.

Q. John Thornley?

A. Oh, yes; John Thornley.

Q. Did you buy some from both or only from Thornley?

A. Sometimes I would go to one place and sometimes to the other.

Q. Do you know by whom this packing was made?

A. I do not.

Q. What kind of packing did you ask for when you went to Thornley's?

A. Steam-packing.

Q. Did you know it by any other name?

A. I never asked for it by any other name, I think.

Q. You have spoken of two kinds of rubber packing. Did you know them by two different names?

A. Well, that that I improvised myself?

Q. No; I refer to that you bought.

A. That that I bought was made in sheets, as I said before, to pack the embossing presses—they were about 14 inches one way and 3 or 4 the other—to keep the steam in.

Q. I refer to the gum packing as used by you that had no cloth in it. Who did you buy that from?

A. Well, I cannot exactly remember now; I think Mr. Levan & Adams. They were then machinists in the same place.

Q. What is that?

A. In the same building that my bindery was in at that time.

Q. How much did you buy from them?

A. Small quantities. I could not state the amount.

93 Q. About how many pounds in all?

A. That I could not tell you.

Q. As much as two pounds in all?

A. Oh, Yes; more than that.

Q. More or less than three pounds?

A. I could not give you the exact weight of it.

Q. Well, two pounds, as nearly as you can come to it?

A. About that.

Q. How many purchases of this stuff that you call gum packing without any cloth in it did you make—more than one?

A. Oh, yes; I bought it on several occasions.

Q. When did you last buy any from anybody?

A. Probably five years ago.

Q. When last before that?

A. Well, I could not tell you.

Q. As much as seven years?

A. Yes; I suppose it is.

Q. Was it more than seven years? Are you sure about it either way?

A. I cannot say right positive, but I think I bought it ten years ago.

Q. Was this the first purchase of this fibreless gum packing that you ever made?

A. I think not.

Q. Are you sure of that?

A. Not right positive.

Q. Then the first purchase of this fibreless gum packing that you ever made may not have been more than 10 or 12 years ago?

A. I think it was before that.

Q. Are you sure that it was before that?

A. Yes; I may say positively that it was before that.

Q. How long ago, then, is it?

A. I could not say positively, but I should judge it was over 12 years ago.

Q. Who did you buy this garden hose from that you afterwards cut up?

94 A. I bought it of one of my neighbors at that time; I didn't go to the store for that; it was a man who used to be superintendent for the large machine works down in Southwark.

Q. What is his name?

A. His name is Joseph McCullogh.

Q. What did you pay him for it?

A. I don't remember.

Q. Was it second — hose?

A. When I got it it was.

Q. It was an old one?

A. It was not very old when I got it.

Q. Cannot you give the time when you purchased it from him?

A. I cannot.

Q. Was it prior to 1875?

A. Yes.

Q. Was it prior to 1874?

A. If I mistake not, it was about at the breaking out of the rebellion.

Q. Well, can you swear positively that it was as long ago that you bought this hose from a neighbor as 1870? I want your positive knowledge on the subject.

A. Yes, sir; I will swear positively that it was, for at the time I bought that hose I was living in the western part of the town, and I have been there 18 years.

Q. What date did you leave the residence you have spoken of in the western part of the town?

A. We lived out there, I think, in 1867.

Q. Can you be positive about that date—1867?

A. Yes, sir.

Q. Will you be certain that it was not as late as 1869?

A. I am sure it was not.

Q. How do you fix the date at 1867?

A. By the time I have lived up where I am living now.

Q. What is your present residence?

95 A. 18—no, 1626 North 10th.

Q. Is that the place that you referred to as being the one from which you removed in 1867?

A. No, sir.

Q. Well, where did you reside next previous to the residence in North Tenth street?

A. I lived then in Warneck street; it was between Columbia and Warneck streets, between Tenth and Eleventh.

Q. And where next previous to that did you live?

A. Out in the western part of the city.

Q. Give the street number, please.

A. The houses in those days were not numbered; I lived in what was called Winter street between Schuykill, 7th, and 8th, in those days; now between 20th and 21st.

Q. How many pounds of packing did you buy in any store prior to 1869?

A. Well, I could not tell.

Q. As much as one pound?

A. I could not tell; I always bought it in small quantities when I was buying it in that way.

Q. Well, you cannot be certain whether you bought one pound in the aggregate or over?

A. No; I could not tell.

Q. Might it have been as small a quantity as half a pound in the aggregate?

A. Well, I could not tell positively.

Q. Now, in respect to the construction of this garden hose, can you be positive that it had two plies of canvas?

A. The garden hose was made by wrapping (interrupted)——

Q. Please answer the question directly; can you be positive that it had two plies of canvas?

A. Yes, sir; it was what we call double hose.

Q. Independently of what you bought it for, of your own knowledge, do you know whether there was two plies or three plies in it?

96 A. Two plies.

Q. You know that of your knowledge?

A. I know that.

Q. Will you undertake to say that that canvas was coated—that is, on one side or the other with a coat of rubber—what is ordinarily termed a coat of rubber on canvas?

A. I don't understand what you mean. It was a film of gum on the outside, not very thick, then came the canvas, and we wrapped it around and around, and it would be wrapped over a little so as to make it double all the way around.

Q. Does it have any film of rubber on the outside?

A. Yes, sir.

Q. Then it has a film of rubber on the outside and on the inside?

A. Yes, sir.

Q. What I want to get at is this (interrupted)——

A. It seemed to be put together by gum.

Q. I want to know whether on either side it had any more than

a coating of rubber such as is ordinarily rubbed on canvas, for the purpose of making it water-proof, in the manufacture of hose?

Question objected to for the reason that the witness is not presumed to know how hose is manufactured as to the thickness of the rubber layer which is put on to make it water-proof.

A. The gum on the outside I should judge to be as thick as that card you have in your hand, or thicker (witness referring to a card which Mr. Lee held in his hand at the time).

Q. Well, you put gum on the inside; how thick would that be?

A. It would be about the same.

97 Q. Did you use this garden hose for packing because you thought that you could make a better packing of it than that which you buy in the stores?

A. No, sir. I used it simply, as I said before on the examination, because I found it was handy.

Q. You simply used it because you wanted to be economical?

A. That was the principal reason.

Q. And if you had any packing of the kind sold in the stores you would not have used it?

A. I do not suppose I would.

JAS. S. LEVER.

Sworn to and subscribed before me this January 14th, 1885.

LEWIS W. SCOTT, *Examiner.*

S. LLOYD WIEGAND, a witness called on behalf of the defendants, being duly sworn according to law, deposeth as follows:

Direct examination by Mr. LOWTHORP:

Q. Will you please state your name, age, residence, and occupation?

A. S. Lloyd Wiegand; 759 North Fortieth street, Second ward, at Philadelphia, Pa.; mechanical draughtsman and engineer, and, incidentally, solicitor of patents; my age is 51 last birthday.

Q. How long have you been engaged in the engineering business?

A. I have been engaged in the engineering business since—directly on my own account as machinist and engineer, making work for sale—since the first day of August, 1854; prior to that,

98 while a boy, I was engaged in mechanical pursuits, first, as an amateur, and afterwards as an apprentice, since 1854. I have been engaged in engineering pursuits and mechanical operations ever since.

Q. In your work as a mechanical engineer have you had any occasion at any time to use or to see used packings for steam-engines, cylinders, &c.?

Examination of this witness objected to by complainant's counsel so far as it tends to prove prior use or knowledge, because the same is not properly pleaded.

A. I have frequently.

Q. What kind of packing have you used or seen used?

A. Do you wish me to state in narrative form the kinds I have used and the times I have used them and the periods of art I have used them in?

Q. Well, you may do so.

A. I can save time better.

Q. Yes.

A. My first knowledge of packings for piston rods, valve stems, and pistons was when a boy, about 1845, in the steam-engine in my father's factory, and some model engines which I then made. The packings then used were hemp or tow in the large steam-engines and in the models strands of lamp wick. About 1855 to 1860 packings made of woven fabrics and braided fabrics came into use and, in some measure, displaced the tow packings.

Q. What period was that?

A. From 1855 to 1860.

The introduction of such things was gradual. It came with the introduction of vulcanized rubber goods into the market and various forms of such packings were used, some using rolls of
99 cloth cemented together, others using strands of yarn braided together by a machine, and others using layers of cloth cemented together—in some cases bound with net-work of wire cloth to improve the durability, and sometimes with plumbago or black lead and soapstone to produce a lubricating effect. Cemented packings came into use in which layers of woven textile fabrics were fastened together by an adhesive compound of India rubber.

Pieces of belting, rubber belting, were sometimes employed for packings and showed far more durability. My knowledge of the use of rubber belting, scraps, and pieces of other rubber fabrics in which layers of cloth were cemented together was from about the year 1859—1858 or 1859, onwards. I have used both strips of rubber belting and strips of hose consisting of layers of cloth cemented together by India rubber as early as 1859, and have off and on used it ever since when I had no other more convenient packing material.

There was not at that time such an assortment of sizes of packings in the market as at present.

In using rubber-belting scraps it was common to cut the strip of belting slantwise, across, so that it could be bent easier to apply it in circular form around the rod and in the stuffing box; and in using bits of hose for like purposes it was common to cut it straight with the line of the hose, and it was then found that the strips were more flexible and more readily adapted to the stuffing boxes and rods to which they were applied. In applying them they were curved around the rod so as to present the edge, the cut edge of the fabric, to the rod; in conjunction with these additional pieces of India rubber were employed so as to help to pack them and make them elastic.

Q. To help them do what?

A. To pack them and make them elastic so as to apply closely

to any inequalities in the surface of the rod which moved against them.

100 When used for water purposes it was a frequent expedient to let the gum come in contact with the plunger and water of the pump, but for steam purposes the contact of the rubber part of the fabric was undesirable with the valve stem, the threads forming the fabric as they were presented to the rod and wore better.

For convenience in applying such strips of cut packing (cut belting made into packing and cut hose made into packing) it was frequently practised by wrappings of lamp wick so as to hold it together—the parts together when applied. The elastic part of the India rubber was put next to the stuffing box or on the circumference of such packing, and the cloth layers inside against the rod, and by screwing the gland down on the packing the packing was compressed in the direction of the length of the valve stem and forced inwardly against the stem.

Q. When you say stem what do you mean?

A. The valve rod or stem—the cylindric rod which is attached to the valve to move it or to the piston to receive motion from the piston. Such rod moves lengthwise through the packing, and the purpose of the packing is to prevent the escape of steam around the rod through the aperture through which the rod must work back and forth. I would add the purpose of the elastic feature in the arrangement was to accommodate it easily to the imperfections in the form of the rod, the inequalities of the surface, such surfaces not always being made perfectly true and cylindrical, and losing their form by wearing sometimes, also.

Q. Have you seen used or have you used yourself the various packings which you have described in your answer to the last question?

A. I have, repeatedly, both in engines of my own and those I have sold to others and repaired for others.

101 Q. You speak of cutting belting so as to make a packing of it. Can you describe—can you tell why you cut that belting diagonally?

A. Because I found that when I cut it straight the old pieces of belting would frequently break on the outer edge instead of bending. The belting before I used it had been pretty severely tried in running grindstones, and I found that when I cut it with a right line in the direction of the belting, unless the strips were extremely narrow, they would break on the outer edge in bending, and the workmen who were employed in the same place had like experience and they did the same thing—they cut diagonally so as to let it bend, as a tailor or persons who make garments cut a piece of goods bias that they intend to bend.

Q. Was the intention, then, in cutting belting diagonally to make it bend?

A. Yes, sir; so as to present the fibres diagonally, and they were of such short length that they will draw on each other instead of breaking, as would be the case were they long and continuous throughout the entire length of the strip.

Q. I understood you to say in your previous answer that the layer of duck and rubber in this belting were placed vertically against the wearing surface, did I not?

A. With the plane of the canvas, vertical or at right angles to the surface—that is, the cut edge was presented against the rod surface—the wearing surface.

Q. In presenting the cut edge of the duck to the bearing surface, where the duck is cut bias, would the sides of the thread composing the duck be exposed to wear or not?

A. No; the threads would be presented diagonally to the ends of the threads, diagonally against the rod.

102 Q. But the ends of the threads would be presented diagonally against the rod. Did you ever use any sort of that packing yourself?

A. Made in this manner?

Q. Yes.

A. Repeatedly; I have owned and run quite a number of steam-engines in manufacturing.

Q. When did you use that belting cut in that way as packing?

A. The first I know of was at 812 Race street.

Q. In Philadelphia?

A. In this city.

Q. When was that?

A. I can't fix the year; I think about 1858 or 1859.

Q. Did you use it at any time after that?

A. I have used it repeatedly after that; I used some in a steam-engine I sold to Mr. Lever.

Q. What Mr. Lever is that?

A. James S. Lever, bookbinder, in this city.

Q. The gentleman who was examined here this morning?

A. He has testified here in this case.

Q. When you used that belting which you have just spoken of in 1858 or 1859, did you use anything with it as packing?

A. Yes, sir.

Q. What was that?

A. An elastic strip put all around it. That was rubber with a spring in it, not joint packing, but rubber packing—that is, made without any textile or fabric in it. It is elastic rubber; you cut it off of sheets in strips something of the character of this. (Witness produced sample of rubber.) You can make a nicer fitting with it than with joint rubber, which is not elastic (but contains a fabric or fibre), and is used to put between two surfaces with lamp wick, and under pressure in one direction will extend in other directions, so that when pressed downward with the gland, and when endeavoring to press sidewise, would press the fibres or fabric part

103 against the rod. That is the kind of stuff we call elastic rubber, as in contradiction with joint rubber.

The piece of rubber referred to is marked "G. L. W. S." for identification.

Q. Can you illustrate to us how you used that in connection with the strip of belting you have spoken of as a packing?

A. I have not got a strip of belting at hand just now; I have a piece of very heavy fire-hose which is similar in texture; I can show how it is done with that.

Q. Please illustrate with that.

A. We took a piece of belting that had not such a thick coating of rubber as this has in the one side, but consisted of layers of canvas vulcanized with India rubber, and cut into a strip so that it was bias to the weave of the cloth; then we wrapped lamp wick around it so as to hold it fast to the strip of elastic rubber, and bent the two strips together so that the elastic rubber was on the outside of the bend, and on the inside of the bend we placed the cloth with its cut edge against the rod. These pieces were cut at such a length as to completely encircle the rod once or more, and were forced down into the stuffing box, and one layer after another was put in, so that the joint of one ring thus formed would be covered by another portion of the next ring. We proceeded in this way until we put enough in to make the packing in the stuffing box; then we pulled the gland down upon it by means of the usual screws until it squeezes the rubber and cloth downward, and presses the edges of the cloth against the rod. When heat was applied, steam being used in the engine, the temperature causes the elastic rubber to adhere to the other
104 part or cloth portion of the packing, and whenever it leaked we tightened it a little more so as to tighten it further against the rod. Lamp-wick lashing or wrapping did not last a great while; the real wear is on the fibres of the cloth.

The piece of rubber packing and strip of hose wrapped by the witness are marked by the examiner for identification "H, L. W. S."

Q. Is the strip of hose which you have embodied in "H" similar to or different from the hose which you say you have used as a packing?

A. It is different in no material respect that I can observe. It is not different in any material respect that I can observe. We did not always or often have hose quite as thick as this, but took two pieces together very often for the convenience of making up rings and putting them in.

Q. You stated in your answer to a former question that you cut strips from the hose straight. Will you please state why you did that?

A. Because we found that when we had so cut them that they had the best properties of flexibility, the threads of the warp of the cloth from which the hose is made being spiral in the making of the hose in most of the hose that I have used, although I have found some that has run lengthwise, but very little, and I have not found such to be the best.

Q. Would, then, the ends or the sides of all the threads or any of the threads of which the duck is woven be presented to the wearing surface?

A. As cut with the threads diagonal to the line of the strip they are presented obliquely, endwise, to the wearing surface of the piston or valve of the rod.

Q. How great a proportion of the threads would have their ends oblique to the wearing surface?

105 A. All of them where the entire fabric is cut bias.

Q. Then do I understand you that by cutting strips of hose straight where it is wound spirally, as you have described, the layer of duck within the hose would all be cut bias?

A. Undoubtedly they would, because if they are diagonal with the line of the hose and are cut in the line of hose it must necessarily cut them bias.

Q. Did you in fact ever use as a packing strips of hose in which all the layers were thus cut bias?

A. I have.

Q. Can you state when and where you have used such strips?

A. I could not undertake to state all the places where I have used them. I can specify some. I know that I used them in the engine that I sold to Mr. Lever when he had the book-bindery on Seventh street, west side, above Filbert street, in this city. I found such packing in that engine when I bought it. It was a second-hand one. They were around the pump plunger. I put it in around the piston rod, and I think I put it in the valve rod, too.

Q. When was that?

A. Oh, it was prior to 1863, I think; certainly not as late as 1864.

Q. Have you ever used strips of hose with the layers of duck within the hose cut bias in this manner at any time and place?

A. I have, and have had them used by persons in my employ.

Q. Will you state when and where?

A. When I was in the machine business, in 1866 or 1867. It was at 618 Chestnut street, in this city, and at 619 Sansom street, half a block off—right here; I can point out the house.

By Mr. LEE:

Q. Is that the same house?

A. In the same house; it extended through.

106 Further direct:

Q. Then you think that this hose cut in strips as you have just described. Did you use it alone?

A. In the piston rods of the engine. I put the rubber with it, the same as I showed here in the specimen marked "H" for identification.

Q. Do you mean to be understood as saying that the specimen marked "H" is a representation of the packing you made by hose with rubber?

A. With rubber that I used in there. I don't say that these are the dimensions, but that the arrangement was substantially as I have shown you here.

Q. Did you use that packing made of hose or gum in the same

way or a different way from what you used the packing made of belting?

A. I used it just in this way.

By Mr. LEE:

Q. Like in Exhibit "H"?

A. Like in Exhibit "H."

Further direct:

Q. Which portion of that was next to the wearing surface?

A. The cut edge—the weave of the stuff.

Q. What is the function of the rubber strip tied to the strip of hose or strip of belting with lamp wick which you have described?

A. To transmit and convert vertical pressure from the gland into lateral pressure upon the woven cloth, so as to press the woven cloth laterally against the piston rod. India rubber in this condition has the property of transmitting pressure from one direction to another, and is somewhat elastic after it transmits the pressure so as
107. to follow it up, and yet to yield a little if there are any irregularities or inequalities of the rod passing through the packing and close against the rod after such projections or inequalities have gone through, and thus avoid leaks. All packings measurably have some elasticity, but this is better in that respect.

Q. Do you know what vulcanized India rubber is?

A. I know how it is made. I don't pretend to understand the chemistry of it. I have heard the chemistry of it explained so differently that I doubt if the chemists understand it.

Q. What are its qualities as in contradistinction to rubber that is not vulcanized?

A. The pure rubber that is not vulcanized is not plastic. I mean the crude rubber imported in bags, lumps, and bladders. It cannot be moulded as rubber can which has been kneaded and prepared for vulcanization.

Vulcanizing principally consists of kneading or moulding the gum so that it becomes a paste or plastic and can be moulded into any form, and when it is exposed to a certain temperature a change takes place and it acquires the elastic properties and tends to retain that form always, so that when liberated from the moulds in which it is retained at the time of vulcanizing by heating it will resume the shape that the mould has given it. Other materials are put in when making vulcanized fibres which impart or effect this property. If threads or fibres are imbedded with it they prevent the operation of this elastic property in a great measure.

An instance of such fabrics of rubber that are non-elastic or imperfectly elastic is in the packing of the sheet gum, which is used in the steam-pipe joint and the steam-chest joints.

108 Q. Was or was not the rubber strip you used at the time you mentioned in combination with the strips of hose or belting subjected to vulcanization?

A. I could stretch it and it would come back, like that I have here. I didn't examine the chemical condition of it. It was elastic.

I got it of John Thornley. I asked for elastic rubber and got it. He had a man by the name of Daniel Thomas, who used to attend the retail department, and he got out and cut a stock of materials and selected them for customers.

Q. Do you know what is called Tuck's packing?

A. I do.

Q. Can you describe that packing?

A. I can. It is made in a number of forms.

Counsel referred to Defendants' Exhibit Tuck's English Patent.

Q. Have you had occasion during your experience as an engineer to work from mechanical drawings?

A. Repeatedly and continuously, and to make them.

Tuck's English patent shown witness.

Q. Please examine the drawing attached to that patent and state what you see—what you understand by it.

By Mr. LEE:

Q. What is the number of that patent?

Mr. LOWTHROP: English patent, 1865.

A. It shows cross-sections of the packing described as containing the rubber or elastic in the rubber core wrapped around with canvas. The difference in form consists in the manner in which the canvas is disposed around the rubber core, and also the shape of the rubber core.

109 In some forms it is nothing but a square strand or core of rubber having elastic properties and a piece of cloth wrapped around it, the folds of the cloth being cemented with India rubber to itself and to the core. In some instances the cloth is folded so as to present the preponderance of cloth on a side and the rubber on the other in the packing; in others the elastic core is central.

The purpose of this arrangement is to present the cloth where the greatest friction or attrition is upon it and the rubber at the place where it will press the cloth towards the rubbing surface of the rod. The difference in form resulting from the modes of disposing of the cloth change the form of cross-section and all results in the packing. There are some forms shown in these drawings of which I have never seen any specimen. I can recognize figures 1, 2, 4, and 9 as like some that I have seen exhibited as samples; the others I don't think I ever met. I don't think I ever saw any of those—that or that. (Witness showing Mr. Lee the diagram and illustrating, designating Figs. 7 and 8.)

Q. In those figures, or rather in the packing which you have seen and which are represented by the figures you have mentioned, can you state how the duck, of which they are composed in part, is disposed? In other words, when that packing is in use would the ends of the threads or the sides of the threads of which the duck is composed be presented to the wearing surface as the packing was worn off layer by layer?

Objected to as leading.

A. It depends upon the stage of the wear in which the packing is. When first applied, if applied intact, such packing presents a surface of the cloth and not the ends of the fibres or threads to wear.

110 As the wear proceeds the ends of the threads of the outer layers are presented, until finally, as in figure 1, all the face cloth or cloth presented facewise to the rod wears through. The same is true of figure 2, and in figure 4, as the wear progresses, it will come to a place where the ends of the threads are subjected to wear. The same is true of figure 9.

The practise is pursued in using such packing of cutting that to the breadth to adapt them to the spaces between the side of the stuffing box and the piston rod, which subjects more of the ends of the fibres and threads and less of the surface of the cloth to wear. Immediately upon using the packing the relative proportions of which are so subjected to wear varies according to the line in which the cut is made. The pencilled line marked X X which I find across figure 9 illustrates the direction in which such cut is made to narrow the packings when the box is too narrow to receive the whole of the packing.

Q. You say that when the practice of cutting this packing is pursued certain results follow. Have you ever known such packing to be cut before?

A. I have seen stuffing boxes in which such packing was employed in which they were in that condition. I did not see the cutting done, but I have seen the packing that was removed from such boxes showing that they were in that condition.

Q. When did you first, to the best of your recollection, see such cut packings?

Objected to as assuming what the witness has not stated.

A. I have first seen such worn packing exhibiting the ends of the threads to wear, as near as I can tell, as early as in 1867.

Q. When packings of the kind you have spoken of and which are shown in the drawings in the exhibit handed you last is cut

111 down, being used or worn down by use, how does it compare with the packings which you have illustrated in "H"?

A. For all operative purposes it is the same with the presence of the remaining bits of cloth, which still have their faces presented to wear.

Q. In the Tuck's packing so cut down or worn down in the layers of duck which, by such cutting or wear, had their edges exposed to the wearing surface or the rod are the sides of the threads or fibres composing the duck or their ends exposed to the wearing surface?

A. The ends appear to be exposed.

Q. When did you first see Tuck's packing in the stuffing box with the edges of the layers of duck exposed to the wearing surface, as you have described it?

A. In a double-hoisting steam-engine which I purchased and refitted and sold to Charles G. Wagner, of Montgomery, Ala. I first saw it when I took the engine apart in my shop.

Q. Where was that shop?
A. 618 Chestnut street.

Certified copy of United States letters patent No. 13145, dated June 26th, 1855, granted to Joseph Henry Tuck, being shown witness.

Q. Please state what, upon examination, do you find that packing to show.

A. It shows a packing with an elastic core and an enveloping woven cloth covering cemented around the same, and illustrates the application thereof to the stuffing box, the function of the elastic core being to press the textile portion of the packing against the rod.

The cementing material is set forth to be "India rubber" and canvas saturated with India rubber or other suitable material or composition. The enveloping covering is described as cut
112 into diagonal strips, which are cemented with the diagonal ends together, so as to form any length of fillet required, the patent reading: "Cement the diagonal ends together so as to form any length of fillet required; then roll it up into a roll of suitable diameter required. In cases where a greater elasticity is required he rolls the canvas around the core or centre pieces of India rubber or other suitable elastic material."

The several figures, 1, 2, 3, 4, and 5, show sections of different forms of packings so made. Figures 1 and 2 do not appear to contain an elastic core, but figures 3 and 5 are shown as containing the elastic core.

In figure 5 the elastic core is in the form of a tube and placed to one side of the strip of packing, the predominance of the cloth upon the other side of the strip being produced by folding or wrapping a roll of cloth upon itself before laying the rubber tube into the roll, after which the balance of the strip or fillet of cloth is wrapped around both the rubber core and the previously rolled cloth. When such packing is cut into rings and placed in the stuffing box of the steam-engine and compressed by the gland it is similar in its operation and properties to the flat forms of packings shown in the English patent previously referred to in my testimony. The fibres are presented where the ends of the fibres by wear come in contact with the piston rod, in an oblique direction to the piston rod. Longitudinal fibres in such packing are avoided from its mode of construction.

Letters patent shown witness are filed in evidence and marked by the examiner "Tuck's U. S. Patent, 1855."

Certified copy of the English letters patent granted to Joseph Henry Tuck, dated October 13th, 1852, No. 384, offered in
113 evidence and marked by the examiner Defendants' Exhibit "Tuck's English Patent, 1852," shown to witness.

Q. State what upon examination you find to be the packing shown in this Tuck's 1852 patent.

A. I find the packing having the elastic part thereof composed of rolls or folds of canvas coated with India rubber, some of it formed

in the shape of tubes or ribs or blocks of India rubber, and they are used in conjunction with segmental or other suitably shaped pieces of wood or metal, which are intended to lie or work in contact with the metallic surfaces of the piston rod or piston or cylinder, the segmental or other shaped pieces being kept up to the rubbing surface by the elastic pressure of the yielding substance. Said yielding substance is represented to consist of India rubber.

There are some other details connected with this, such as lubricating arrangement in the gland, which have no bearing upon the packing. The several figures of the drawing show modifications of the forms of stuffing boxes and segments in which the invention is applied. The general principle of construction throughout all the illustrations of the invention is that folds of cloth and India rubber, either worked in with the cloth or wrapped up in it. The elastic element presses the harder substance of the segments in some instances against the rod and in other instances presses the canvas against the rod. Such packings are made in parts, so that they can be applied around the rod and when placed together form a complete circle. When united they form a continuous surface presented to the rod. That is all that I see shown here.

Adjourned until Thursday, January 15th, 1885, at 10 o'clock a. m., at 23 E. State street, Trenton, New Jersey.

114 United States Circuit Court, District of New Jersey.

NEW YORK BELTING AND PACKING COMPANY, Complainant, and ALLEN MAGOWAN and Others, Defendants. } In Equity.

Continuation of case pursuant to adjournment.

Appearances as heretofore.

Testimony taken at the office of Lewis W. Scott, Esq., examiner, 23 East street, Trenton, N. J., at the hour of 10 o'clock in the forenoon, January 15th, 1885.

A certified copy of the record of English letters patent granted to E. Keirby, dated January 4, 1865, No. 19, filed in evidence and marked Defendants' Exhibit "Keirby Patent, 1865."

Objected to as not pleaded.

Direct examination of S. LLOYD WIEGAND continued by Mr. LOWTHORPE:

Q. (The same being shown witness.) What do you understand to be the improvement shown in that patent?

A. The packing consists of a strand of elastic material forming a central core, with strands of fibrous material braided around the m after the manner of the plaiting of a whip or whip stock.

115 The drawing of said patent illustrates the structure of such packings and their application to both piston rods and stuff-

ing boxes. In these packings the fibrous material is disposed diagonally to the line of the packing, being spirally around the central core in both directions and interlaying with each other as applied in the stuffing box ; the side of the fibre of the coil of packing nearest to the piston rod bears against the piston rod. As they wear off the ends of the fibres are presented by reason of the several strands of fibrous material, as braided together, interlacing them, are disposed in waves and the bends or prominent parts of these waves first make a contact with and wear against the rod. There appears to be a lubricating compound used with which these packings are saturated and they are rolled into a flat shape.

Several strands are described as united in a woven covering or binding left in a loom, and they are then subjected to a hot bath of lubricating compound and are declared by the patents to be ready for use. The packing when applied to a piston it is stated should be equal in breadth or width to the groove of the piston ; the coils of such packings are described as applied to the piston rods in the stuffing boxes, as shown in the figure 5, in successive layers, the drawing in figure 5 indicating that the flat side of the packing is applied to the stuffing boxes and the piston rod, and that they are compressed by the gland, marked small *a*, in the direction of the screws shown in said figure. They effect a pressure upon the gland small *a*, and it compresses the packing in the direction of the length of the piston rod and causes it to expand sidewise, and, being restrained from spreading at its circumference by the stuffing boxes C C, it presses inwardly toward the rod ; the elastic property of this packing is due to the presence of the vulcanized India-rubber cores around which the fibres are braided.

116 A certified copy of the English letters patent granted to John Edwin Keirby, granted August 11, 1866, No. 2064, offered in evidence and marked by the examiner "Defendants' Exhibit Keirby's English Patent, 1866."

Objected to as not pleaded.

Q. Please state what improvement you discover in that patent.

A. The said patent shows and describes a packing material consisting of a central core of wire covered with an envelope of India rubber, upon which a fibrous covering material is braided ; the fibrous material is described as being saturated with red lead and knitted over the core by an ordinary knitting machine ; the lines of the drawing indicate, however, that the coverings should be braided and not knitted ; such packing is applied by coiling it into a flat gasket, as shown in figure 4, which is then served or wrapped over with the fibrous covering marked "A" in said figuring and shown as served on it.

Such packings are applicable to joints, but are not described as applicable to piston rods or stuffing boxes ; these joints are such as those that occur between flange pipes where such packings are used.

A certified copy of the record of English letters patent granted

to Francis Wise, March the 8th, 1865, No. 647, filed in evidence and marked by the examiner "Defendants' Exhibit Wise Patent."

Q. Please state what you see in that patent.

Same objection, that it is not pleaded.

117 A. Said patent is described, and shows the packing for use in stuffing boxes and the round piston rods and valve stems, which packing is composed of a body of canvas or other textile fabric or fibrous material wrapped around a core of India rubber and over the body of cloth; but metallic wires are braided so as to form a wearing surface of metal; such packing is to be applied in rings surrounding the rod and placed within the stuffing box, and it is stated that "when the covering metal has been worn away that the packing may be removed so as to present a new wearing surface, this operation being repeated until every portion of the metal has been worn away."

There is no illustration or drawings of its application, but merely a drawing showing the construction of the packing material, as composed of a core, cloth envelope, and the enveloping braiding wires in a straight strip. The function of the core of rubber is to impart an elastic property to the packing.

A certified copy of United States letters patent number 63071, granted to James McLean, March 19, 1867, *and* offered in evidence and marked "Defendants' Exhibit McLean Patent."

Q. (Showing witness said patent.) Please state what you find in that patent.

A. It shows segments of an absorbent material adapted to — pressed against the wearing surface of a cylinder in the piston packing by an elastic cushion or backing of India rubber; the absorbent segments in the piston packing are marked "C." The elastic backing is marked "R," and shown in figure 2. In figure 3, a packing in which the absorbent blocks or segments are upon the inside of the groove is shown, and an elastic backing of rubber is on the
118 outside of them; and the packing thus formed is applied in the stuffing box of the piston rod, marked "S," in figure 1.

The packing shown in figure 2, having the absorbing blocks or segments upon the outside, is shown in figure 1 as applied in the piston marked "P" in figure 1.

Q. Have you concluded your answer?

A. I have concluded my answer. I might add to it that a lubricating material is described as being employed with these segments; and strips of zinc and lead are described as used in conjunction with alloys of antimony in the sheet lead. That is all.

U. S. letters patent granted to Charles McBurney June the 28th, 1859, number 24569, offered in evidence and marked by examiner "Defendants' Exhibit McBurney Patent."

Q. (Said patent shown to witness.) Please state what improvement you find described and shown in that patent.

A. The packing for stuffing boxes, consisting of several laminæ of woven cloth cemented together with India rubber and cut obliquely into strips, so that the woven thread of the fabric is all diagonal to the line of the strips. Such strips are shown in figure 2 as bent around into rings, applicable to stuffing boxes, and are shown in sections as applied to a stuffing box around a piston rod marked "D" in figure 3, so that the outer edges of the laminæ of canvas as placed in a stuffing box bear against the sides of the stuffing box and the inner edges against the side of the rod or valve stem "D;" in this construction of packing the ends of the threads are presented obliquely to the wearing surface of the rod "D."

119 The same patent also describes and shows a mode of cutting the cemented pile of canvas laminæ into strips parallel with the line of the threads of the fabric, and cutting said strips diagonally across, as shown in figure 4, and then assembling the pieces so cut, as shown in figure 5, as to present the fibres of the woven fabric obliquely at the edges of the fabric, in effect producing the same result as that shown in figures 1, 2, and 3 when in use.

The patent points out the difference between fabrics so cemented and cut obliquely and applied in rings from similar fabrics cut into rings and perforated with holes of the size to fit around the rod upon which it is to be used, and also from such fabrics when cut in the direction parallel with the threads of the weaving, and declares a superiority in performance to arise as a consequence of this direction of cutting and oblique application of the fibres to the rod in the stuffing box. Among other things it states that when such packings are cut into strips parallel with the weaving that the "short transverse threads prevent the packing from yielding with a sufficient ease when the follower was brought down upon it."

The followers are frequently called glands; and another objection to such strips cut parallel with fibres alleged by McBurney in his patent was that "the longitudinal threads of the strip were thrown out of place by the motion of the rod, leaving the packing with an uneven surface."

Q. (Complainant's Exhibit "A" being shown witness.) What is shown and described in that patent as you see it?

A. The said patent to Gately shows and describes a packing in which the laminæ of canvas are cemented together by India rubber and cut in the same manner as McBurney's patent, just described by me, upon one of the edges—that is to say, upon the cut ends of the fibres an elastic backing of India rubber is put. The

120 drawing shows a covering of canvas, marked "C," applied to the back of the elastic backing, which strip is marked small "c," and is alleged to protect it from injury. Such packings are not shown in the drawing as applied, but are set forth in the specification as operating with the rubber strip, forcing the edge of the packing against the piston rod to prevent leaking and compensating for any slight wear in the packing and making a tight joint between the rod and the packing.

The patent further sets forth that it is "manifestly impossible to impart this quality of elasticity to the body of the packing, or that

part which is in contact with or forced against the rod, but by backing it with an elastic cushion, which, upon being compressed between the follower and the sides of the stuffing box, acts as above described."

The patent specifically refers to the kind of packing patented by Charles McBurney June the 28th, 1859. In the body of its specification he claims "the combination of such packing with an elastic backing or cushion of vulcanized India rubber, substantially as and for the purposes set forth."

Q. How long has the art of vulcanizing India rubber been known?

A. Since the invention and publication of Goodyear's patent, in 1844 or thereabouts—forty years old.

Q. Well, it has been generally known in the art of rubber manufacture since that date, hasn't it?

A. Yes, sir.

Q. Referring to the Exhibit McBurney Patent, the specification thereof, you say, states the advantage in the matter of wear of the packing made of laminæ of duck cut bias over plies of duck cut straight and presented vertically to the wearing surface. Has your experience with packing ever enabled you to discover whether
121 or not there is any difference in the manner in which such packings wear?

A. I have used very few pieces of packing in which the threads of the packing or the woven part of the packing were parallel with the strips, because I have found it inconvenient to curl them when cut in that way. I have noticed that when such strips are used, though, that the lengthwise strands of the strip nearest the rod are compressed into little loops; in fact such little loops exist in the weaving, and these loops wear off.

I don't suppose I have ever made such a test as to give any accurate statement as to the relative durability of such kinds of packing, an oblique cut and a parallel to the rod with a cut surface to it. After you once have a parallel-cut packing in the stuffing box it works fairly well, better than common hemp packing, in any event; it is harder to pack; it takes more force to introduce the parallel-cut packing than does the oblique-cut packing, more force screwing down the gland.

In using such packings, when I have discovered leakage, I have found it advantageous to loosen the packing a little and allow the steam to blow into it so as to soften it, and then tighten it up again afterwards. I suppose the improvement in this packing is due to the absorption of moisture by the fibres and to the softening of the gum by heat.

This expedient of slackening the leaky packing and permitting it to become saturated and then tightening again is known by quite a number of engineers of my acquaintance. From the question it appears to be implied that the oblique-cut packing like the McBurney's presents the ends of the fibres perpendicular to the rod. Such is not the fact. They are presented obliquely to the rod, but in a

plane at right angles to the length of the rod they converge, but intersect each other.

122 The McBurney patent avoided the presentation of the loops of the woven fabric to wear, and shows only the oblique ends of the strands exposed, as does also the Gately patent.

Q. What effect is produced upon a rubber backing of vulcanized India rubber, shown and described in the Gately patent, when that packing is in use, the engine upon which it is used being worked by steam?

A. It is pressed down by the gland or follower in the direction of the length of the piston rod. Being confined by the walls or sides of the stuffing box, it exerts a pressure inwardly and moves the laminæ of canvas resting against it inwardly towards the piston rod, causing an intimate contact of the edges of the cut fabric with the piston rod.

India rubber has a property like fluids when under pressure of transmitting motion in almost all directions, in all directions, I may say, and when compressed in a close space will vent out its bulk in the weakest points of resistance in the enclosing chamber, just the same as fluids will under pressure. The gland and follower and the bottom and walls of the stuffing box being unyielding, the India rubber under pressure finds vent upon the yielding cloth pressing towards the piston rod, thus enforcing contact of the edges of the canvas with the piston rod.

Q. In using the packing constructed by you and marked "H" in similar situations to those just described and under similar conditions what effect was produced on the strip of rubber packing in this packing, and how did it act?

A. When in the stuffing box it worked just in the same way. The lamp wick was mere surplusage for convenience in the application. The rubber not being cemented to the bit of old belt or hose, it was convenient to secure them to each other by wrapping them with lamp wicks. After they had been used and packed down by

123 the gland it became the same thing in performance; it was not so convenient in application on account of being patched up in that way.

Q. In using the packing represented in section in figures 4, 5, and 9 in the drawings of "Tuck's patent of 1864" under similar conditions what would be the effect produced by the use of the rubber core "A" shown in those drawings?

A. The operation would be the same and the resulting effect would be the same, namely, the pressure of the gland downward towards the bottom of the stuffing box, and the unyielding walls of the stuffing box would compel the ring of rubber "A" in that packing to be contracted in its inner diameter here (witness illustrated with a ring of packing), and forces the ring used in this packing inwardly, and it would be contracted and would press the cloth marked "D" towards or against the piston rod.

In my answer it is understood that this packing is cut in rings and placed in the stuffing box.

Q. In using the packings represented by the figures 1, 2, and 3 in

the drawing annexed to that patent what would be the operation of the rubber cores "A" in a similar situation to those described?

A. It would operate in precisely the same manner, the canvas resting against the wall of the stuffing box and against the hemp of the stuffing box in the follower being mere surplusage or inert material, occupying space, but performing no useful functions, the portion of canvas between the core "A" and the piston rod being pressed in the direction of the ring of the rubber core "A" against the piston rod.

Q. ("Defendants' Exhibit Tuck's English Patent, 1855," being shown witness.) In using the packing marked in figures 3, 4, and 5 in the drawings of this patent what would be the effect produced by the rubber cores shown therein?

124 A. It would be the same for all useful operative effect, the only difference being in the form in which the inert or surplus canvas is disposed. It would perform the same function in the same manner.

Q. (The "Wise patent, 1865," being shown witness.) In using the packing shown in the drawings annexed to that patent what would be the function of the rubber core "A" shown therein?

A. Precisely the same—to afford an element of elasticity and the conversion of the lengthwise pressure of the gland into a pressure laterally against the piston rod, so as to enforce contact of the braided wires "E" "E" covering the packing with the piston rod.

Q. (McLean's patent being shown witness.) In use in the mode before described what would be the function of the rubber core "R" shown in the drawings of that patent?

A. To furnish an element of elasticity and transmission of pressure or a conversion of direction of pressure from the gland or follower, so as to compel those segments forming the bearing surface or face of the packing against the piston rod or cylinder surface.

Instead of cloth in this case cork is substituted for the bearing or wearing surface. The function of India rubber is the same; its function and mode of operation is the same.

Q. Do you wish to be understood as saying that the rubber cores and backing shown in the patents which you have just examined and in "H" the backing "H" performed a function similar to that performed by the rubber backing shown in Gately patent?

A. The function and the mode of performance is the same in all these cases inquired into.

Q. Please examine and compare the article marked "B," 125 "L. W. Scott, examiner," the part marked "B" in figure 4, and the part marked "D" in figure 9 of the drawings of "Tuck's English patent, 1854," the part marked "A" in the drawing of Gately's patent, and described in the specification thereof, and state in what respects they resemble each other and in what respects they differ from each other, both in their construction and function.

A. The specimen marked "B, L. W. S., examiner," has layers of canvas cemented together with India rubber, the fibres or threads of which layers of canvas are disposed in the same manner as the thread in the drawing of the part marked "A" in Gately's patent. The can-

vas marked "B" in Tuck's 1854 specification or drawing accompanying the specification and the figures referred to in the answer contain representations of layers of canvas rolled upon each other, having the fibres or threads in a diagonal direction to the line of the packing. In this respect they are alike. In Tuck's patent there is a surplusage of layers of canvas, which is oblique with the wearing face of the packing and not presented edgewise. That portion included between the pencil line "X" "X" and the letter "D" in figure 9 indicates such surplusage. Upon the removal of the surplusage, either upon wear or by cutting it, it becomes the same as canvas layers of the specimen marked "B, L. W. S.," for identification; those of the upper and lower threads, portions of the packing, would, whilst the central thread would not.

Q. When the packing shown in figure 9 is worn down or cut down to the line "X X" what would be the function of the plies of duck still remaining that are parallel with the surface of the rubber core "A"?

A. They are inert; they are not operative as the others which are exposed obliquely; they occupy spaces; they do very little good, as they wear away, though they then expose the other
126 portions until the wear reduces it to about the part marked with the letter "C"—capital "C."

Q. (Plaintiff's Exhibit Trenton Rubber Works, May 27th, 1884, J. K.," being shown witness.) Compare that article.

By Mr. LEE: You have not the "X X" on that; here is one that has; there might be some usefulness in it.

By Mr. LOWTHORP: Thank you.

Mr. STENOGRAPHER: What was the question?

Q. Compare that article.

Mr. LOWTHORP: Oh, yes.

Q. Compare that article with the piece of hose marked "B, L. W. S., examiner," with the packing marked "H, L. W. S.," and state in what respects they differ and in what respects they resemble each other.

A. In the specimen marked "H, L. W. S.," all of the threads of the woven fabric are presented diagonally to the edge or wearing face. The same is true with respect to the specimen marked "B, L. W. S." In the complainant's exhibit marked "Trenton Rubber Works, May 27th, 1864," S. D. Olyphant, examiner, the central portion which is marked "X X" on the said exhibit appears to be cut lengthwise with the woven fabric, whilst the outer portion appears to be cut diagonally, so that the part marked "X X" in the centre of said specimen presents end threads, and also threads in waved or serpentine lines to wear, whilst the outer portions of the said exhibit are the same as the wearing fibres of specimens "H" and "B," "L. W. S.," but only as to the fibrous part do you wish me to testify?

Q. As to the whole specimen.

127 A. In the specimen marked "H" there is an elastic backing tied to it by a bit of lamp wick. In Complainant's Exhibit "Trenton Rubber Works," referred to in the question, there is an

elastic backing cemented to the waved portion, which has a covering of canvas upon the back of it; when in use in the stuffing box they work in the same manner. The lamp wick in specimen "H" where it crosses the working face of the packing very speedily wears off, and the other portion of the lamp wick remains as inert matter or surplusage in the stuffing box.

In the specimen marked "B, L. W. S.," there is no appearance of rubber backing, by which the packing would be forced, as in the other two cases, against this rod, in the other two specimens enquired into the elastic rubber upon the flat sides of the cloth in said specimen being a sample, or is part of the rubber which formed with the canvas a piece of high-pressure hose before it was cut up, the thick rubber of said specimen being the lining of the hose, and the thinner rubber the covering or outer section of the hose.

Recess was taken at this point.

After a recess of 30 minutes the examination was resumed.

Q. What have been your opportunities for informing yourself as to the state of the art relative to packings for steam-engines as it existed from 1854 or 1855 up to the present time?

A. My tastes always led me into mechanical engineering operations, and my associations were and are with men engaged in like occupations. I have dealt considerably in machinery and steam-engine supplies, and conducted a machine works on my own account until 1868, in which I employed sometimes 60 hands, and since that time I have been engaged in engineering in an advisory capacity and as an expert in regard to steam-engineering. I have
128 been the steam-engineering lecturer of the Franklin Institute, at Philadelphia. This brought me in contact with most of the inventions and contrivances that were in use. I have practised and participated in handling engines and testing and making examination of them with reference to the changes proposed in them, and have purchased them for both myself and for other parties and attended to the repairs of them. In the course of this I have been obliged to make use of packings and examine the parts of engines involving the packings. My intercourse with the dealers in such material has brought to my knowledge many of the materials used in the art.

I have found, like in other arts, this one has also been gradually developed; sometimes contrivances found in the earlier stage of the art have been reinvented. The packing of engines, I believe, is a matter of mechanical skill rather than of invention just now; almost every engine-tender knows how to do it.

Q. Is that all?

A. That is all.

Q. Yes, sir. Are you, then, in fact acquainted with the art relative to packings for steam-engines as it existed during the period named in my last question?

A. I believe I have been conversant with the state of the art as it has existed for the last twenty-five years—as it has been practised.

Q. Taking the Complainant's Exhibit "Trenton Rubber Works, May 27th, 1884," the packing marked "D," "L. W. S.," respectively, the article shown in complainant's "A" Gately patent, in Tuck's patent of 1854, and the other patents which you have examined here, can you show us the difference between them and exemplify the progress of the art?

Mr. LEE: Well, "D" and "H" both have lamp wick.

129 Mr. LOWTHORP: Yes; they are practically the same, but termed a little different.

A. Back to what period do you wish me to go?

Q. Well, as far back as 1855, if you can; I don't know whether you can go that far back.

A. Irrespective of the published state of the arts as shown in patents, the feature of imparting an elastic property to the stuffing-box packings and making them so that they would apply to the rod readily and closely by pressure of the gland on them, by incorporating in them or with them an India-rubber core or backing, as it has been termed in this case, was practised as it was shown and known in the patent of Tuck, 1854.

The disposition of the fibres used in conjunction with that was subject to change, and consisted of wrapped canvas made into rolls, as it was used at first; braided packings then came into use gradually, in which the fibres were diagonal, but not presented in the plane at right angles to the rods until wear took place. This is constituted as one of the most common engineering expedients of packing with strips of rubber, or strips of hose, rather—strips cut from vulcanized-rubber hose—such as is shown in specimen B, as marked for identification in this case, only in using such strips the thick laminæ of rubber was not used which appears in that specimen. In fact, in the hose in general use at that time there was very little of it that had so many layers of canvas in it, but it was cut in the same way and applied.

The practice of backing it or filling in around the box with India rubber in an elastic condition—applying India rubber at the time of putting it into the stuffing boxes—was practiced, to my certain knowledge, about 1866 and long afterwards. It did not strike me as new or involving invention at the time. Springs of various kinds had been used in conjunction with packings to confine them to

130 rods. Metallic packings had been used with springs, and rubber springs. As the public became familiar with vulcanized-rubber fabrics they were introduced in a great many applications where metallic springs had heretofore been used. The substitution of one spring for another I do not think involved invention at the time; it was simply a matter of skill. I have seen piston rods that had a metallic ring in which rubber was put inside the chamber of the piston rod, between the rod and the rings that formed the piston, and a projection of the follower which had an extension which worked into the inside rubber. The rubber was used as an expedient, which, pressed endwise, would expand and spread the piston rings. The packing of the stuffing box was a similar appli-

cation, and the use of rubber in conjunction with a laminated cloth was an obvious expedient. I didn't know that as early as that, though, that there was any such packing made exactly as Complainant's Exhibit Trenton Rubber Works, May 27th, 1884. This is not the specimen I had this morning. It is like it, and it may be a piece cut off the end of it. It is so like it I do not suppose it makes any difference, although it was a shorter one marked the same as this is.

Mr. LEE: I didn't have any other out. I guess I can find what you mean.

(Counsel then produced and handed to the witness the specimen referred to.)

Mr. LOWTHORP: The shorter one is but a duplicate.

WITNESS (continuing): I wasn't aware of the existence of such packings as this at that time (1866) in which the rubber was already fastened to the packing, with the diagonal cut edge of the cloth made ready for the use by putting and connecting them together one with the other, with an outer canvas covering; but their association, when put in the box in that manner, is for the same
131 purpose and done when it was needed to be used. It was only an ordinary expedient, used when it was needed, and was so practiced without thought of invention. Packings in which the elastic elements of the rubber was incorporated with the packing were then (1866) in use, but they were enclosed within the packing, so that the rubber was only exposed in cross-sections of the packing at the time it was applied. The specimen marked "D" in this case differs in one respect from what I have seen it. It is surplusage of India rubber on the flat side of the cloth, but otherwise it is just as I have seen used in India-rubber packings or layers of canvas lashed onto a strip of India rubber. It does the same work as the packing, Complainant's Exhibit Trenton Rubber Works, but the rubber in this specimen is a surplusage, as it occurs on the flat side of the canvas in specimen D, and would soon waste away. In the running of such packing India rubber in its elastic condition in contact with oils such as are used to lubricate steam-engines, and at the temperature of steam and with the motions of a rod through it, does not last long, but the other part of it, the canvas, is like what was then used, and which would do the same work when in operation as Complainant's Trenton Rubber Works Exhibit does.

The packing marked "Complainant's Exhibit Trenton Rubber Works, May 27th, 1884, J. K., S. D. Oliphant, examiner," in which two crosses are marked in one place, appears to be the same as Complainant's Exhibit Trenton Rubber Works, 1882, with the exception only of the crosses marked on it and the part on which they are marked. There the fabric or woven stuff seems to lie lengthwise in the center of it, and in the sides of it the threads appear to be diagonal to the line of the packing. It would do the same work as the other packing, but would not be so easily applied. It differs from the earlier expedients practiced by engineers, from the
132 fact that the backing of rubber is fastened to the cloth por-

Q. Is there, then, any material difference in the matter of wear and effect and in the manner of presenting the flat surface or edges of the duck to wearing surface?

A. No very material difference, not in principle, because in the flexure of the packing where the flat surfaces occur in applying them to the rods by bending them into rings the compressing and shortening of the inner circle of the fibre forces them into loops which are pressed closely together and present their edges to the moving rod, whilst the same effect nearly takes place when forced together more closely—that is, the threads in the cut edge of the packings. It is only when the piston rod is so rough as not to be properly serviceable that either of these packings will strip or cut out threads with the motion of the rod.

Q. Have you heard or read the testimony of James S. Lever, William M. Smith, and William F. Harrison in this case; and, if yea, what invention do you find to have been required at the
136 period prior to the Gately patent that they testify of to make the packing described and claimed in the said Gately patent, keeping in view the state of the art as shown by the several letters patent you have referred to in your testimony and the state of the art as you knew it and have testified of prior to the time of the grant of the said patent, giving your opinion as concisely as you can and also your reason for such opinion as you may express?

A. None; because, as testified to by Lever, Smith, Harrison, and myself, and as shown in McBurney's patent, diagonal or bias cut packing of laminæ of canvas cemented together with India rubber were known and used. Such cemented bias-cut laminæ were used in conjunction with an elastic backing, as testified to by Harrison and Wiegand, as shown in two exhibits, and by Smith, as cut from the Tuck flat packing, the cementing of an elastic core to the cemented laminæ, arranged with the woven threads diagonal to the line of packing, appearing in Tuck's patented packing. The several elements of the combination forming Gately's claim—to wit, laminæ of rubber-cemented cloth with the threads of the weaving diagonal to the wearing edge of packing and such laminæ combined and cemented to an elastic piece of rubber—were then known and shown in Tuck's patent, together with a surplusage of outer canvas, and the practice of using elastic rubber with cemented and diagonal-cut cloth laminæ and without such surplusage of outer canvas was then practiced. In the manner in which the several elements of Gately's claim operate when in use there was nothing new in any of them, nor does any new result or change in the mode of producing the result arise from the particular mode of combining the several elements; neither is the means of attaching the rubber backing to the canvas laminæ by cementing with rubber new, in view of the mode in which Tuck's packing with the enclosed rubber
137 strip is put together. The only thing remaining, apparently, is neater workmanship in the making of an article previously known and used.

S. LLOYD WIEGAND.

Counsel for defendants filed in evidence the articles heretofore marked for identification, and they were marked by the examiner as exhibits in the case in the following manner respectively:

Article marked A is marked Exhibit A on the part of the defendants.

Article marked B is marked Exhibit B on the part of the defendants.

Article marked C is marked Exhibit C on the part of the defendants.

Article marked D is marked Exhibit D on the part of the defendants.

Article marked E is marked Exhibit E on the part of the defendants.

Article marked F is marked Exhibit F on the part of the defendants.

Article marked G is marked Exhibit G on the part of the defendants.

Article marked H is marked Exhibit H on the part of the defendants.

Cross-examination reserved.

138 United States Circuit Court, District of New Jersey.

THE NEW YORK BELTING AND PACKING COMPANY
vs.
ALLEN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN.

The hearing in this case was continued on the 14th day of February, A. D. 1885, at the office of Lewis W. Scott, Esq., in the city of Trenton, N. J.

Present: F. C. Lowthorp, Esq., of counsel with defendant-, and B. F. Lee, Esq., of counsel with complainants.

S. LLOYD WIEGAND, a witness heretofore produced and sworn, being again produced on the part of the defendants, testified furthur as follows:

Cross-examination by Mr. LEE:

Q. Will you state in detail your experience as an expert in patent cases?

A. Do you wish to know in what cases I have been an expert?

Q. Yes; and at what times.

A. I can't state all of them, because I have been in so many, nor give the dates from recollection with accuracy. The first case in which I was an expert was in the United States circuit for
139 the eastern district of Pennsylvania, in reference to grinding mills for agricultural purposes.

Q. The answer called for "when"?

A. About 1858.

Q. Have you been continuously engaged in that business ever since 1858?

A. I have frequently, but not continuously, been engaged in the sense of doing such work to the exclusion of other business. I have been engaged in gas-meter manufacture, as an expert in patent cases, in steam-engine cases, in surgical appliances, dental appliances, lamp and luminating apparatus, hydraulic-engineering patents, and in miscellaneous patent cases.

Q. When were you originally retained as expert in this case?

A. I think about three months ago; perhaps less; within two months.

Q. Was it not some time prior to the 29th of October last?

A. It was about a week prior to that—say the middle of October. I fix this date by referring to the date of an affidavit made October 29th by me in this case.

Q. Did you have principal charge of looking up the evidence for the defense in this case?

A. I reviewed the evidence that had been looked up. The several matters recited in the answer had already been collated.

Q. Did you not investigate the matters and give or procure the information that led to the taking of the examination of the witnesses Harrison, Smith, and Lever at your office, in Philadelphia?

A. The appearances of those witnesses in this case was through my informing complainant's counsel what they knew.

I had been aware of Mr. Lever's knowledge of the matters testified to in this case for years; Mr. Harrison's, probably, in a general way, since July or August, and Mr. Smith's from some time later than that; of the exact knowledge of the matters that Smith and Harrison have testified of in this case I procured that knowledge in the month of November, I believe, 1884.

140

Q. How did you first come to find out that Harrison and Smith had the knowledge of which you have spoken?

A. I asked them if they knew anything about such matters. I knew that Smith had been in the navy, and I knew that Harrison had been in the Confederate service, and they had both, in discussing matters with me when I was having machines made in their establishment (I am a customer of both places), told me of some of the make-shifts they had to employ when they had not the material at command they wanted. I asked about the time that I made that affidavit particularly what they knew upon that topic, and they gave me in a general way the information that appears in their testimony.

Q. Was your conversation with either of them in view of the existence of this case? I refer to the conversation which you say took place in summer.

A. With Harrison? I only testified as to Harrison in the summer. If you mean with Harrison I will say that it came about in this way: I am having built a gas engine in the works of Renington Company, in Wilmington, Delaware, of which Mr. Harrison is the mechanical manager, and had some difficulty in reference to the packings employed in that engine, and he then recounted some of the packing expedients he had resorted to, and, remembering this, I thought when I knew of this case—it was first in about the middle of October—that Mr. Harrison would know something pertinent to

the case. I then made my inquiries specifically in reference to this case.

Q. Did you make any inquiries of any dealer or dealers in
141 India-rubber goods with a view to obtain information that might lead to the production of evidence calculated to aid the defence?

A. I have asked questions of employees of the William Heaton rubber store, Chestnut and 5th streets, Philadelphia, and the Goodyear rubber store, Chestnut and 3d streets, Philadelphia.

Q. Did you make any similar inquiries of any other persons, whether engineers or rubber dealers or persons engaged in any other employment, and who have not been called as witnesses in this case?

A. I have.

Q. How many persons have you made such inquiries of who have not been called as witnesses?

Objected to.

A. Quite a number; not more than twelve and not less than six. I can't remember the precise number. I have an extensive acquaintance with engineers and men in machine trade and machine-supply trade.

Q. Well, all these persons were who did business in and around Philadelphia?

A. Most of them were.

Q. Where were the others in business?

A. They had been scattered around in different parts of the country. I could not recollect specifically where just now.

Q. What was your first business, when did it commence, and where was it carried on?

A. I always had a liking for mechanical work, and while a school boy made model steam-engines in brass, some of which are still preserved. In September, 1848, I was placed as an apprentice in a surgical instrument and druggist supply and apparatus and britannia ware factory of Wiegand & Snowden, 15 North 5th street, Philadelphia. A large part of my work in that place was the making of tools, molds, and dies and making and repairing machinery to make these goods with.

Q. Who composed that firm?

142 A. Thomas Snowden—the late Thomas Snowden; he is dead, and my father, the late John Wiegand.

Q. How long did that employment on your part continue?

A. With their firm until I was 21 years old, ending on the 28th of July, 1854.

Q. What did you next do?

A. I opened a factory of my own in partnership with one James Patchel, who had been a foreman in Wiegand & Snowden's establishment, and my business then was chiefly with druggists' machinery and apparatus. I made most of the machinery, and the largest part of the work I attended to was to find the money to carry it on with. This partnership terminated about September of the following year, I think; no, I think it must have terminated about

June of the following year. I then, on the 1st of August, 1855, opened a factory for the same business at 812 Race street, Philadelphia, and remained there until 1857. Meantime I had engaged in the firm of Borden & Wiegand as iron founders in Philadelphia, which lasted less than a year. I then went into business almost exclusive of machinery and druggist apparatus—apparatus for manufacturing chemists and druggists—and expanded this business into general machine work, which business I continued in until 1868. During this time, from 1858 onward, I had been in the habit of preparing application for patents, and, after 1868, engaged in the business of superintending, consulting engineer, and expert and solicitor in patent and other causes requiring engineering skill and have continued until this date in such business.

I have had occasion in this practice to make a great many inventions myself and to examine for myself and others many inventions made by other parties and to report thereon.

143 Q. Please describe fully and in detail the nature of the business which you have just spoken of as being of apparatus for manufacturing chemists and druggists which was expanded into general machine work, and give the details of such expansion.

A. It was first making machines for pill manufacture. The requirements of this business from the simple machines for retail druggist grew to the making of large and rapid working machines for the wholesale manufacture of pills for the manufacturers of proprietary medicines. With this came the making of mass-mixing machines, grinding machines, stirring machines, evaporating apparatus, boilers or steam-generators, and steam-engines, and shafting for driving such machinery, and supplies and details incident to the use of such machinery. I made in connection with it a great many chemical experimental apparatus, some of which developed into illuminating gas apparatus of capacity for lighting towns.

Q. What particular part did you take in this business down to 1868?

A. I had the designing and constructing of such work, and for most of the time financiering of the business.

Q. Did you furnish the capital?

A. I earned most of the capital as I went along. I had $80,000 in the business at last, and I began with less than $500.

Q. Why did you discontinue that business in 1868?

A. Because parties I was connected with in contracts in that business did not pay me in such a way as to leave it safe to continue the business.

Q. What became of the business?

A. I sold off portions of it and part of its plant so as to reduce it to a smaller business, and my foreman and brothers-in-law, Robert P. Thompson and William P. Thompson, his brother, engaged in the business and continued to this day.

144 Q. Do you mean to be understood that you realized $80,000 when you parted with the business in 1868?

A. No; I had that capital in the business; that was not all profit.

Q. Did you realize any profit when you parted with the business in 1868?

A. I did, apparently; but, when I found what difficulty there was in collecting, under advice of my heaviest creditors I placed all my affairs in the hands of an assignee in bankruptcy; since then I have been discharged from bankruptcy, and my estate appears to be adequate to pay everybody in full, with a surplus of $40,000.

Q. Is the estate still in the hands of the assignee?

A. Yes, sir.

Q. Do you mean that cash assets, or assets equivalent to cash, are in hands sufficient to produce the result you state, or is this a matter of uncertainty and hope?

A. It is a matter of advice and information of counsel; he has charge of the matter.

Q. Can you give the date of your going into bankruptcy and the appointment of an assignee?

A. I can't without reference to memorandum. (After reference:) My discharge dates June 18th, 1881. Petition was filed August 31, 1878; the order of reference September 2, 1878. I can't at present give the date of the appointment of the assignee.

Q. What was your business immediately after you gave up the business that you have spoken of in 1868?

A. As I have stated, consulting and superintending engineer, during which time I made a number of improvements in sectional steam-boilers, which were patented, and also a number of improvements in steam-engines.

Q. Did you have any factory or store after 1868, when you gave up such business?

145 A. Nothing beyond storage for patterns and a small model shop or pattern shop, where experimental work was done. The larger work I had made by machinists by contracts in other shops.

Q. Will you state your several places of business from the time you became 21 until you gave up the business in 1868? Please state them in the order of time.

A. From August, 1854, to August, 1855, the N. E. corner of Bread and Quarry streets, Philadelphia; from August 1st, 1855, to—I can't tell the month—the fall of 1858, 812 Race street; from the fall or early ensuing winter of '58 to about the winter of 1859, at the N. E. corner of Bread and Quarry streets again; from the winter of 1859 to 1867, midsummer, 404 Library street, Philadelphia; from the spring of 1863 to the summer of 1868, 112 Chestnut street and 619 Sanson street, Philadelphia; from the spring or early summer of 1857 to the midsummer of 1858, or fall, 119 and 121 Coat's alley, now Craven street, Philadelphia. This was the foundry I referred to, and the machine shop adjoining. It has always been my practice, when I could, to have one shop in operation before evacuating the old one, and sometimes have continuously run two shops at one time. I have incidentally, for a short period, for experimental purposes, used other places for special manufacture and experiment; probably six or eight times in this interval.

Q. Does that carry down beyond 1868?

A. No; in 1868 I moved into 112 Bread street. That ends my business down to 1868. Since that time my headquarters have been in an office, and I have had no factory or shop except for experimental purposes.

Q. How many India-rubber stores were there in Philadelphia that kept on hand such goods as packing between the time you came of age and the time you went out of manufacturing business in 1868?

146 A. I only know of two India-rubber stores in Philadelphia which dealt in India-rubber goods exclusively—Thornley, now Heaton's, and Dietrich's, known as the Goodyear's rubber store, on Chestnut, near Third street.

Q. Those two stores still exist, do they not?

A. Yes, sir; although I believe both the original proprietors are dead. Mr. Thornley is dead, to my certain knowledge; I think Mr. Dietrich, who started the other store, is also dead. My dealings were confined almost entirely to Thornley's. I will here add that packings were not sold so much by rubber stores as they were — machinery and belting-supply stores.

Q. What machinery and belting-supply stores did you purchase any packing from from the time you came of age until you went out of business in 1868?

A. That I can't tell you; our purchasing was done mostly by others for me. I made many purchases of Billington, J. H., formerly of Decatur street, now of Chestnut and Letitia streets; Pratt & Freeman, Walnut street near Third; Charles N. Smith, Third street, No. 135; and there are several others of whom we bought supplies which I can't remember now.

Q. Did you buy rubber packing from all the places named?

A. I don't know.

Q. Did you buy as much rubber packing from the persons you have last named as you did from Thornley and the Goodyear rubber store?

A. I don't know that I ever bought any packing from the Goodyear rubber store; I avoided dealing with them, and so far as I do know I have bought rubber packing from Thornley, because I have sometimes gone there to select it in person. About the purchases from the others, I could not tell with any certainty without referring to the memorandums in my books, and then it would only be from inferences drawn from the entries.

147 Q. Can't you state whether the rubber packing used in your business at that time was mostly purchased from Thornley or mostly from the machine-supply dealers?

A. No, because we used but little of it, and it is a matter which received but little attention until I engaged in making steam-generators, when my purchases became very extensive, and they were of joint packings and not stuffing-box packings. I assume that your inquiry is directed as to stuffing-box packing.

Q. Was this steam-generator business carried on before or after 1868?

A. I commenced it in 1866, and by 1868 the sales had amounted to $600,000, about, as near as I can estimate now.

Q. How much stuffing-box packing did you ever purchase from Thornley?

A. I don't know.

Q. State as nearly as you can.

A. I don't think any of my purchases at Thornley's were of complete packing, but of material of which packings were made. When I bought anything of that sort it was what we call pure or elastic gum. It had no fibers in it.

Q. How much stuffing-box packing was ever purchased by or for you from the machine-supply dealers that you have spoken of?

A. I could not tell now; we did not use a great deal of it; a large steam-engine does not require ten pounds of it. The chief purchasers of this packing are the mill-owners who run the engines. The makers of the engines seldom furnish the packings themselves, but apply the packing that they find at the mills, as a general thing. When an engine has to be tested by the maker at his shop, then he has to pack it. Thirty pounds of packing is enough for a 300 horse-power engine.

148 Q. Did you build any steam-engines in the course of the business that you retired from in 1868?

A. Yes, sir; quite a number.

Q. How many?

A. I could not tell you now. There have been steam-engines built in my shop that I never saw.

Q. Why did you never see them?

A. I was frequently absent from the shop, sometimes a month or two at a time.

Q. What was the largest of those engines and what was its power?

A. I don't think I made anything over 60 or 80 horse-power.

Q. Are you sure that you made any over 40?

A. I think we had one 16-inch bore; I can't tell whether we built it or not.

Q. Give the dimensions of the largest engine you built.

A. I think the largest was 16-inch bore and about three-feet stroke.

Q. How large was the smallest engine that you built in that period?

A. I think about a three-inch bore and probably about 6 or 7 inch stroke. I had as many as 20 different patterns, some of which patterns had several built from them and the others had none.

Q. Did you build 20 engines between 1858 and 1868, when you retired?

A. I think I must have built more than that.

Q. Are you certain that you built more?

A. I would not be certain, but that is my opinion.

Q. Are you sure that it was more than 12?

A. I know that I have sold more than that many engines, and the proportion of those that I have built and those that I had sold

I could not now state. I can ascertain any facts in reference to this matter by reference to the books and accounts of the business.

149 Q. Are you sure you bought any stuffing-box packing from the machine-supply dealers already referred to prior to your retirement in 1868?

A. I am certain that I got some from Pratt & Freeman, because Mr. Pratt asked me what I thought of it and how I liked it.

Q. Was this rubber packing?

A. I think it was; it was packing that was laminated—a cloth laminated stuff.

Q. Did you suppose it to contain India rubber?

A. I suppose it was India rubber and cloth together; it had the sulphurous smell of India rubber.

Q. You speak of the use of rubber belting for packing some time after 1858. State the time when and the place where you first used a piece of rubber belting for the purpose of packing.

A. As near as I can remember, it was in an engine I purchased from Jas. T. Sutton & Company, and run at 812 Race street.

Q. Do you mean that this packing was in the engine when you purchased it?

A. No; I mean that I put it in there.

Q. Are you certain that you put it in that engine, and at 812 Race street?

A. Of that I am sure, because I know I used a piece of old belting that had been run on the grindstone in that place.

Q. What was the engine at that time used for?

A. For driving my machinery.

Q. How long had you had the engine when you so used this piece of belting?

A. I could not tell that definitely; I suppose I must have had it three or six months.

Q. How long did you continue to use that engine? When did you part with it?

A. When I moved away from 812 Race street.

Q. In what year was that?

A. 1858 or 1859. I can ascertain these dates definitely, if it is important.

150 Q. State exactly what you personally did, concerning the use of that old belt for packing purposes, in Race street on that old engine.

A. I took the old packing out of the packing box, washed a piece of old belt off clean from the grit and dirt that was on it, put a straight edge slantwise across it, and with a knife such as they cut leather with cut it into strips. Then I took some sheet rubber and put along with it on one edge of these strips, wrapped common lamp wick around this strip of rubber and old belt, wrapped it around the piston rod, marked the place where the ends met, and cut it off. Then I cut a number of other strips off to the same length and put them in the stuffing box, with the rubber against the side of the stuffing box. Then I put the gland on and screwed it down. When it got hot it settled down so that I had to put some more pieces in.

Q. Did you do all these acts with your own hands?

A. Most of it I did; I think all except the screwing down. A man named Steiner worked for me at the time as engineer, and I think it is probable he screwed it down.

Q. Who was present and saw you do what you did do in the matter?

A. Think most likely the engineer was, if I am not mistaken.

Q. What was his name and where does he live?

A. The man is dead. His name was Jacob Steiner.

Q. How came you to pack that particular engine on that particular occasion?

A. Because he complained that the stuff he had was not fit to use, and I told him I would show him how to do it.

Q. What was the stuff he had that he complained of?

A. A gasket or a braided strip of hemp, and it was so big that it would not go in.

Q. How came you to use this old belt?

A. Because I knew it would answer.

151 Q. What called your attention to this old belt?

A. I had seen such things cut up into washers for pistons. I knew it would answer.

Q. Had you ever, previous to that time, seen any one else pack an engine in the same way, using old belting?

A. I had seen Henry Stuhl do it on my father's engine, at 15 N. Fifth street.

Q. Did he do it in the same manner—used lamp wick and two pieces of rubber?

A. I am not sure now whether he used lamp wick or hemp; I would not undertake to say which.

Q. Where does this Henry Stuhl live?

A. I don't know now; the last time I saw him was five or six years ago or more.

Q. Where was he then working?

A. Running a steam-engine on Callowhill street, opposite the Broad-street Reading railroad depot, in Philadelphia.

Q. Have you ever heard that he has moved elsewhere?

A. He did not reside there. I don't know where he resides. He must be a very old man now if he is alive; he must be every day of eighty.

Q. Have you been informed that he is dead or has left the place where he was then working?

A. I know the man who now runs that engine opposite the Reading depot, and he told me that Stuhl was too old to work any more. I heard this within six months.

Q. Do you believe him to — much over eighty?

A. Just about that, I guess. He might be eighty-two.

Q. When did you next use, or see used, a piece of rubber belting for the purposes of packing, and where and under what circumstances?

A. I cannot tell when I next saw it used; but I have since then

seen it used in the stuffing box of a steam-engine made by
152 Reanay & Neafie, of Philadelphia, from designs and plans of Mr. Parry. This was at what is now called Seventh and Filbert streets, then called Sugar alley, in about 1859.

Q. How came this scrap of belting to be used on that occasion and how came you to observe it?

A. Parry made a practice of using strips of hose and he had this among it and remarked to me that it was the best thing he had ever found for the service; he did not use any strip of elastic rubber back of it, but just put in the hose and belt strip themselves.

Q. How came you to personally observe this operation on that occasion?

A. I felt interested in machinery, and the engine was a novelty to me at that time. It was the first successful steam fire-engine in Philadelphia.

Q. Who was present on that occasion when you observed that packing?

A. Parry was, and I don't know who else.

Q. Where does he live and what is his full name?

A. I don't know his first name, nor do I know his residence. His business address is care of Campbell & Richards, corner of Howard and Hunterdon streets, Philadelphia.

Q. State all that you saw done in regard to the packing of this steam fire-engine on that occasion.

A. All that I saw done was strips made into rings and put in and the follower screwed on them.

Q. Who performed this work?

A. I don't know who the persons were. I suppose they were the usual assistants in the engine-house.

Q. Were the strips already cut when you first saw them?

A. Yes.

Q. When did you next see a piece of belting used for packing, and where and under what circumstances?

153 A. As I before stated, I cannot undertake to state what was the next instance; it was such a common thing that it commanded no attention. I can state when I have since seen it and where I have since done it.

The first part of the answer is objected to as irresponsive.

The WITNESS: But so far as to being able to state the next in order with any accuracy, I must admit that I am unable to do it. I know that I put it into an engine that Mr. Lever had in his place, as I have already stated. I can't positively state whether it was belting or hose. I think hose was used in that instance; the materials are so alike that they are used interchangeably, and I would not from present recollection distinguish which was used at that time.

Q. Then in each of the instances you have given it may have been belting or hose or other rubber fabric cut into pieces of proper form, may it not?

A. It was undoubtedly belting in the instance where I showed

Steiner how to pack it. In the instance where Parry was packing the engine, he had both there, I know, or what appeared to me to be both. Belting is more open in its texture than the hose canvas is, and coarser too. Mr. Parry stated his preference for the hose as the best thing he had come across yet for that purpose. It was undoubtedly in all instances a rubber fabric of canvas and rubber.

Q. Please state any other instance in which you know rubber belting or hose to have been cut into strips and used as a packing. Please confine yourself to what you did yourself or what you saw done, and give time, place, and circumstances.

A. I would not pretend to particularize time, place, or circumstances of any other instances, although I know I have fre-
154 quently done it and seen it done. I also know that I repeatedly used other kinds of packing, and I could no more remember the particular kind I have used in any particular instance, unless there is some particular circumstance to call it to my mind, than I could remember the details of a meal that I have eaten a long time ago.

Q. Who was present at the time of the packing, in the manner stated, of the engine sold to Lever?

A. Lever was, I think.

Q. Was anybody else?

A. There probably was. I don't remember. It is more than likely Josiah Clark, my foreman, was present, and probably Mr. Jos. G. Griffith, although I am not certain. They were both in my employ at the time and assisted me in part with the work.

Q. Did you pack Lever's engine yourself?

A. It is my recollection that I did.

Q. Are you certain on that point?

A. I feel quite sure.

Q. Where do the persons reside that were present on that occasion?

A. I have not said they were present. I think they probably were.

Q. That you think were present.

A. Jos. G. Griffith resides in the city of New York. I can't tell the name of the street. I find his business address is the N. E. corner of Elm and Walker streets, New York.

Q. And the other one?

A. The other one is dead.

Q. When did you last see Griffith or have any communication with him?

A. I don't remember. I can tell by looking at my letter file. I think in last September, possibly in August—last August or September.

Q. Did it have any connection whatever with his use of packing?

A. No, sir; I don't suppose I have exchanged a word with him on that subject for twenty years.

155 Q. In the first instance that you have specified, what had the belting been used for?

A. For turning a grindstone.

Q. In what manufacture and for what purpose?

A. For grinding cutlery and tool-work in my place, at 812 Race street.

Q. How many strips of that belting did you cut up?

A. I could not tell you now.

Q. Did you cut any of it straight as distinguished from bias?

A. No, not on that occasion.

Q. Was that the first time that you used any of that particular belt that had been used for the turning of grindstones?

A. You mean that piece of belt? It was a remnant.

Q. Do you mean by that that this remnant had itself not been used for turning a grindstone?

A. Oh, no. The practice in grinding is to use a large pulley or pulley wheel to drive the stone when the stone was new and large. This requires a long belt. As the stones wear down in diameter, smaller pulleys are substituted and the belt is shortened. When the belt is shortened so far and so often that too long an end projects beyond the buckle and the belt becomes too old to drive a heavy, large grindstone, we cut a piece off, and it remains thereafter a short belt. A remnant so procured was used in this instance.

Q. What was the width of the belt?

A. As nearly as I can tell, about four or four and a half inches.

Q. How large was the remnant?

A. I don't know exactly. Probably a foot or a foot and a half.

Q. How thick was the belt?

A. Merely the thickness of rubber belting—about a fourth of an inch or a little less, perhaps.

156 Q. How many plies had it?

A. I don't know.

Q. How wide was the strip that you cut?

A. I don't think the strip exceeded a quarter or three-eighths of an inch in width. They were materially less than the space between the rods and the side of the stuffing box.

Q. Please state again the length, breadth, and thickness of the strip that you cut?

A. I can state them with no more accuracy than I have done. The length was about five or six inches. The thickness the thickness of the belt.

Q. State it as near as you can.

A. I suppose a quarter inch or less in thickness. Breadth from a quarter to three-eighths or thereabouts. The length about five inches or a little more.

Q. In any other instance that you can specify do you remember using a belt that had been previously used in running grindstones?

A. I don't think that I can at this day do so, but some of the belts might have been used in such cases.

Q. And are you sure that there was no instance in which you cut the belting with the right line in the direction of the belting as distinguished from bias?

A. I feel sure that I never did for the purpose of stuffing-box packing, though I have in emergencies used belting for joint packing

and other purposes, where I cut without any reference to the direction of the fibres.

Q. But you have no special recollection of cutting it straight?

A. No, sir; I have not. Any man who is familiar with properties of such woven stuff would not cut it so when he wants to bend it afterwards.

Q. How many steam-engines have you owned and run in manufacturing?

A. I sometimes have run a hired engine. Do you want those too?

157 Q. Add anything of that kind that you choose.

A. I believe about six for my own operations.

Recess.

After recess.

The WITNESS: I have hired two engines.

Q. Please state the periods of your ownership of each of the engines spoken of in your last answer.

A. I cannot state definitely the commencement and ending of the terms of each engine, but can approximate. I have used two engines in my operations at 812 Race street. One nearly the whole time I was there, and a very small one for special purposes and experiment for only a few weeks. One at 618 Chestnut street, and also hired one there; two at 112 Broad street; one at 900 Chestnut street. That was subsequent to my getting out of manufacturing, and was a matter of experiment, and a small one for only a few weeks at 404 Library street. I hired the engine for 618 Chestnut street to run a short time at night. I also used one at 119 Craven street.

Q. Do you remember any occasion when you personally cut up hose for the purpose of making a packing for a stuffing box or when anybody else did so in your presence for the same purpose?

A. I remember seeing one of my workmen doing it in Library street about in 1860 or 1861. The name of the man who did it was Andrew Ford, the steam-fitter. Robert Brown, engineer, also, at the same place and at the same time, did so.

Q. Where do they live?

A. The last I knew of Brown was that he was engineer for David Jayne & Son, Chestnut and Third streets; that was about ten years ago. I have not seen anything of Ford since 1865 or 1866. It is my impression, but I am not certain, that he went out West, some place, St. Louis.

158 Q. Did you ever cut up any hose yourself into strips for packing; and, if so, when and where?

A. I remember cutting some up in my shop in Library street, in 1862, and putting it into a small oscillating engine for a steam yacht.

Q. Who was present on that occasion?

A. I think Robert Brown was on that occasion; he is the engineer I have mentioned; possibly no one was present; I am not certain; my supplies of this kind were kept in another room from the shop,

and no one was in this room except those who were engaged in getting out supplies.

Q. Can you specify any other instance of this kind?

A. I don't remember any other instance; it was a common thing to do, and I may have done it a hundred times.

Q. Do you know what is meant by the process of vulcanization?

A. As I have heard — used, it has been applied to the operation of heating India rubber mechanically, mixed with other substances, into a plastic shape, and moulded into shape so as to impart an elastic quality to the rubber instead of its plastic condition. I suppose, strictly speaking, the process of vulcanization ought to embrace the mixing of the material with the rubber, but, as I have heard the term used, it has been limited to the heating part of the process.

Q. Was it not in your knowledge that the process of vulcanization was covered by Goodyear's patent, dated in 1844, and which finally expired in 1865, and was not this a well-known fact in the community, at least to all who had any knowledge of mechanical matters?

A. It was generally known, I believe, that the original patent of 1844 was extended for seven years, and expired in 1865. There are, doubtless, many persons well versed in mechanical matters 159 that don't know much about the terms of patent rights. I frequently meet very skillful mechanics who take very little pains to know about such matters.

Q. Was it not a fact within your knowledge and the general knowledge of the community, acquainted with mechanical matters and the ordinary trades, that the India-rubber goods made during the life of Goodyear's patent were made by certain licensees, as, for instance, a certain company licensed to make balls, toys, and the like, another licensed to make belting, packing, and hose, and others, again, to make shoes, &c.?

A. I have been so informed.

Q. In referring to Tuck's packing, as described in his English patent No. 1865, August 25, 1854, you state that you have seen specimens like figures 1, 2, 4, and 9 exhibited as samples. Where did you see those samples?

A. I think they were of English manufacture, and my recollection is that they were shown me at the Franklin Institute.

Q. Who showed them to you?

A. They were there on exhibition. Novelties of that character are exposed for the inspection of members.

Q. How large were those samples?

A. I can't tell definitely; I think they were a foot or less long.

Q. What led you to suppose they were of English manufacture?

A. I think they were so marked. I am not certain now, but I think they were marked in that manner.

Q. How carefully did you examine them?

A. I bent them and I picked open the corner of the stuff to see what it was made of.

Q. When was this?

A. When they were exhibited at the institute. I don't remember the date, but it was a long time since; I know that.

160 Q. When were you connected with the Franklin Institute, as stated in your direct examination?

A. I have been a member of it since 1855, I think. I lectured there in 1873, I think.

Q. For how long a period?

A. For two winters. I am not certain whether it was in 1872 or 1873; I have forgotten. I can ascertain by reference to my papers of that date.

Q. Is it not true, referring to Tuck's specification and drawing of 1854, that except at the Franklin Institute, on the occasion of which you have spoken, you never saw any specimens of Tuck's packing like figures 4 and 9, and that you have never seen any specimens like figures 5, 6, 7, and 8 anywhere?

A. I have no knowledge of having seen 5, 6, 7, and 8 anywhere. I think I have seen some small bits of figures 4 and 9 or forms intermediate between 4 and 9, which I have been informed were out of blockade-runners engine supplies. The pieces were too little to be used, otherwise, it is true.

Q. Where did you see them?

A. They were shown to me in Philadelphia, at the navy yard, I presume, for curiosities. One of the workmen showed them to me. I can't think of his name just now.

S. LLOYD WIEGAND.

161 U S. Circuit Court, District of New Jersey.

THE NEW YORK BELTING AND PACKING COMPANY
vs.
ALLAN MAGOWAN and Others.

NEW YORK, *February* 28, 1885—11 a. m.

Present: B. F. Lee, of counsel for complainant; F. C. Lowthorp, Jr., counsel for defendants.

Complainant's Evidence in Reply.

Counsel for complainant offers in evidence a certified copy of the file wrapper and contents in the matter of the letters patent granted to Dennis C. Gately, assignor to the New York Belting and Packing Company, January 26, 1869, No. 86296, for improved vulcanized rubber packing; the same is marked "Complainant's Exhibit Gately File Wrapper, &c."

DENNIS C. GATELY, a witness produced on the part of complainant, being duly sworn, deposes and says:

Direct examination by Mr. LEE:

Q. You have already been examined as a witness in this case, have you not, Mr. Gately?

A. I have.

162 Q. You are the person named in the file wrapper and contents in the matter of the letters patent No. 86296, are you not?

A. I am.

Q. It appears by that file wrapper that you made oath to your application for said patent on December 31, 1868. How long prior to that time did you make the invention covered by said patent?

A. Well, I should think it must be at least six months.

Q. What were the circumstances that led to your making this invention?

A. Why, we had previously made the McBurney patent packing, composed of canvas mostly, and we had complaints of its being very stiff and rigid and not easily compressible, so as to make a tight joint in stuffing boxes, and our people at the store wrote up to have us make some experiments to see if we could not overcome that trouble. I made several trials, and finally hit upon this way described in my patent—putting rubber back on the McBurney packing. Is it necessary to describe it in any way?

Q. You might as well state how you put it on—the mode of manufacture—not in detail particularly.

A. We cut the strips; we took sheets of the McBurney packing, after having been made up in proper form, his style, and cut it down to two-thirds the thickness in order to allow for rubber back. I don't know as I am expressing it in very good shape. We then cemented one side of the packing and placed vulcanizable rubber on the surface, on the cemented surface, and covered the rubber with a canvas prepared with rubber on one side and exposed cotton on the outer surface; then put it into the steam plates and compressed and vulcanized the parts together. That gives the idea in a crude way of what was done.

Q. In other words, then, the mode of manufacture is substantially as described in the patent?

163 A. Yes; I would like to put it in that way. The mode of manufacture is precisely as described in the patent.

Q. When this packing described in and covered by your patent No. 86296 was put upon the market how did it turn out?

A. It proved to be very satisfactory. The sales immediately commenced to be large, and very soon we sold more than of the other kinds.

Cross-examination by Mr. LOWTHORP:

X Q. How do you fix the time at which you first conceived this idea of this packing and perfected it?

A. Well, I have no particular data to go by—no records, no memoranda that I made that I can refer to; but from general recollection and from the fact of the people writing up from time to time about this unsatisfactory packing of McBurney's, and my general memory of the thing, that it was at least six months that I was trying to bring this thing about, and finally hit upon this final way.

X Q. Do I understand that you experimented?

A. Yes; I was trying different ways of working at it. I cannot tell exactly what I did at the time; it is so long since that I have forgotten about it.

X Q. Did you begin the regular manufacture of it as soon as you had been able to turn out a perfected article?

A. Very soon after. It was so very satisfactory to our people at the store it was put upon the market, and it was received at once as being a great improvement on the others.

D. C. GATELY.

Sworn and subscribed before me this 28th day of February, A. D. 1885.

LEWIS W. SCOTT, *Examiner.*

164 EBENEZER ROBY, a witness produced on the part of complainant, being duly sworn, deposes and says:

Direct examination by Mr. LEE:

Q. You have already been examined as a witness in this case, have you not, Mr. Roby?

A. I have.

Q. Will you please state in detail your experience in reference to the manufacture of packing?

A. Shortly after the vulcanized rubber was discovered—it was in 1844 when it was discovered—in 1847 or 1848, there was a demand for rubber packing for piston rods. An article was furnished made of fibrous packing cut into strips; that continued in the market for seven or eight years; then Tuck's packing began to come in the market, and pure strips were sold very largely for that purpose, to be used by winding lamp wick around them; then the McBurney packing came in, and then Gately's elastic back packing, and immediately after that followed numerous other kinds of soapstone packing, and hemp packing with rubber core, and various articles down to date. Of these articles I either manufactured or sold the fibrous strips, the pure strips to be wound with cotton wicking, the Tuck's packing—round Tuck's packing—McBurney's square packing, and Gately's square packing.

Q. Please state who manufactured the packing composed wholly or partly of vulcanized rubber during the period that you have spoken of in the United States?

A. What, way up to date?

Q. Extending down to the expiration of the Goodyear patent covering the vulcanized soft rubber.

A. The Boston Belting Company and the New York Belt-
165 ing and Packing Company were the sole manufacturers under Goodyear's patent. I know of no other manufacturers during that time.

Q. How early did they begin to be such sole manufacturers?

A. The Boston Belting Company commenced in 1844 or 1845, I think, and the New York Belting and Packing Company in 1856.

Q. Please state your connection, if any, with either or both of those companies, and the period during which it continued.

A. For several years, from 1845 or 1846, I was in the factory of the Boston Belting Company; for two or three years I was in their store in Boston; in 1856 I commenced with the New York Belting and Packing Company, and have been with them ever since.

Q. Was there any interval of time between the time you were with the Boston Belting Company and the time that you went with the New York Belting and Packing Company?

A. There was about four months. During those four months I was in a large store that sold rubber goods of all kinds and descriptions. I was away from the Boston Belting Company for nearly a year, in California, in 1850, and on my return I resumed the same position that I had there before.

Q. The Gately patent, No. 86296, appears to have been issued directly to the New York Belting and Packing Company; was the application for the same made on their behalf?

A. Well, I don't know whether it was or not.

Q. And in the course of their business?

A. Oh, I didn't understand that; of course it was—oh, yes; it was. I recollect when it was taken out, perfectly.

Q. It was taken out for the benefit of the company in the course of their business?

A. It was taken out for the benefit of the company in the course of their business. Yes, sir.

Q. Do you remember any of the circumstances that led to this invention?

166 A. We were selling quite freely the fibrous strips and McBurney's square packing, and the engineers and others used to complain that when their stuffing boxes were not exactly true they had difficulty in pushing this out against the rod, and I was continually suggesting to our superintendent if there was not some way that he could improve that fibrous packing, or McBurney's packing, so that we should not have so much complaint. This I began at least a year before the Gately patent was issued. My recollection is that Mr. Gately sent in to us from time to time before the patent was issued samples on which we noted our objections to him, and he improved on them.

Q. Can you state as to whether the article had been perfected so as to be a salable article in the form now shown in the patent, and it had been practically tried by being put upon the market before it was decided to apply for the patent?

Objected to as leading.

A. I cannot recollect positively as to that. It was a common thing for me to be suggesting to our superintendent for improvements in all our goods, and I could not recollect as to the exact dates.

Q. Do you know the condition of the market in the United States in the years 1858 and 1859 in reference to this point as to whether or not there was at that time such an assortment of sizes of packing

in the market as at present, referring particularly to packings composed wholly or in part of rubber?

A. I know that when I came to the store of the New York Belting and Packing Company in July, 1856, they had a large stock of every size of square fibrous strips for packing piston rods, and they had a store in Philadelphia which had also a stock of the same things, all sizes, now 308 Chestnut street, still owned by the New York Belting and Packing Company. Both of these stores kept
167 this in stock up to the time McBurney's packing was invented, when both kinds were kept.

Q. The point that I desired particularly to call your attention to was as to whether the variety of sizes in 1858 and 1859 was equal to what could be found at present.

A. There are no more sizes of square piston packing in the market to-day than there was then.

Q. Will you please look upon Tuck's English patent of 1854, No. 1865, and examine the drawing thereof and state whether you understand what the figures represent?

A. I think I do.

Q. Please refer particularly to figures 4 and 9 and state whether you have ever known of any such packing being sold in the United States or used therein.

A. I never did. I have never seen any such packing and I never knew of a pound of it being sold in the United States or any place else.

Q. Did you ever hear of its existence within the United States until testimony was being taken in this cause?

Objected to as leading.

A. I never heard of it before.

Q. If any such packing had existed in the United States and had been used and sold therein between the years 1853 and 1869 state whether or not you would have known of the same from your connection with the business of manufacturing and selling packing.

A. During those years I was the principal salesman of either the Boston Belting Company or the New York Belting and Packing Company, the only two manufacturers of such goods in the United States, and if anything of that sort had been in the market I would undoubtedly have seen or heard of it. I was in constant communi-
168 cation during all those years with the principal engineers and talked with them about their packing and received their orders, and if any of them had ever heard of that packing or seen it or used it they would undoubtedly have said something to me about it.

Q. What figures on said drawing represent packing that you had knowledge of the existence of prior to 1869?

A. Figures 1, 2, and 6.

Q. You might state as to the others.

A. None of the others have I ever seen or heard of until I saw them in this patent suit.

Q. Who supplied the United States Navy with rubber packing during the war of the rebellion?

A. During the rebellion the Government advertised for most of their goods, and we supplied, as I have always understood, the bulk of it, either directly or through contractors; most of it through a contractor.

Q. If there had been in use in the United States Navy during the war of the rebellion any packing such as is represented by any of the figures of Tuck's drawing just referred to, other than the three that you last mentioned, state whether or not you would have known that fact.

A. I know that they never advertised for any such packing, and I think that if ever they used it I would have known it.

Q. State your reasons for your last statement.

A. The engineers of the steamers and the chief engineer of the navy yard were often in our store talking over about the various kinds of packing, and I have had long interviews and consultations with them during all that period as to packing for the United States Navy.

Q. When the Gately packing, covered by patent No. 86296, was introduced upon the market how did it turn out as an article of manufacture?

A. Immediately on the introduction of this packing we be-
169 gan to receive orders for it from the engineers. We sent it to all our agents throughout the United States, and immediately large sales followed, so much so as to supersede in a large measure the sale of the McBurney packing and Tuck's round packing.

Q. Can you give a comparison between the prices at which the Gately, McBurney, and Tuck packings were sold in competition with each other?

A. The Gately packing was sold for from fifteen to twenty per cent. higher price than the McBurney or Tuck's round packing.

Q. What was the relative cost of manufacture of these three kinds of packing?

A. During those years Gately's packing would cost on an average of ten per cent. less than McBurney's packing.

Q. Why do you particularly limit your answer next before the last to Tuck's round packing? Did you make any other at that time or was there any other made at that time?

A. There was no other made; no; that is the only Tuck's packing that I ever saw in the market or heard of.

Q. Who is the largest manufacturer of rubber packing in the United States?

A. I am not prepared to answer that; you mean now, don't you?

Q. Who was in 1869 the largest manufacturer of rubber packing in the United States?

A. At that time the New York Belting and Packing Company was by far the largest manufacturer.

Cross-examination by Mr. LOWTHORP:

X Q. Mr. Roby, in answer to a question of Mr. Lee's you stated

that the Boston Belting Company and the New York Belting and Packing Company were the only concerns that manufactured under the Goodyear vulcanized-rubber patent during the existence of that patent.

A. No; I did not say so.

170 X Q. What was your statement.

A. I said the only manufacturers of rubber packing.

X Q. Embodying the Goodyear vulcanized rubber?

A. Yes, sir; there were other licensees that made rubber hose.

X Q. How do you know this fact to be true?

A. Because I was always informed so by our people that we were the sole licensees, and if there had been any other manufacturers it would have been impossible for me not to have known of it.

X Q. Your knowledge, then, is simply derived from statements made to you by other persons that these two companies were the sole manufacturers of rubber packing under the Goodyear vulcanized process?

A. Yes, sir; I don't know any other possible way I could have known it.

X Q. How do you know that during the war of the rebellion the New York Belting and Packing Company supplied most of the rubber packing used by the Navy Department or purchased by the Navy Department?

A. Because in most cases the Government advertised for their packing, and proposals were sent in. In all of these cases I think that I had notification, and either put in bids direct or through contractors. There were several contractors supplying the Government that bought all their rubber goods of the New York Belting and Packing Company. I so believe, and they so informed me.

X Q. As a matter of fact, you did not always receive the contracts upon which you made bids, did you?

A. Not all of them.

Redirect examination by Mr. LEE:

171 R. D. Q. What were the relations between your company and the Boston Belting Company during the war in respect to whether or not you would have opportunities for knowing what goods the Boston Belting Company was manufacturing and selling?

A. Our relations with them were very close, and our superintendents used to visit each other's factories, and our treasurer held a large amount of the stock of the Boston Belting Company.

R. D. Q. And as a matter of fact were you or not kept informed in respect to the goods that the Boston Belting Company put upon the market during the years that you have referred to?

A. I think that the Boston Belting Company put no goods on the market during that time that I was not perfectly cognizant of.

R. D. Q. When you say that you derived information in relation to the Boston Belting Company and the New York Belting and Packing Company being the exclusive licensees under the Goodyear patent from others state who those other persons were and what their connection was with said companies.

A. I got my information principally from the treasurer of our company and from William Judson, who owned one-eighth part of the Goodyear patent and was president of our company, managed all their patent suits, and had an office in our store.

R. D. Q. Which company do you refer to?

A. The New York Belting and Packing Company.

R. D. Q. From whom was your knowledge on the same subject derived in respect to the Boston Belting Company, and when first?

A. From the same source.

R. D. Q. While you were connected with the Boston Belting Company were they making packing under a license from the Goodyear Company?

A. They were making vulcanized-rubber packing under the Goodyear patent.

172 Recross-examination by Mr. LOWTHORP:

R. X Q. Can you state positively, Mr. Roby, that the Boston Belting Company put out no goods that you did not know about at the time we are speaking of?

A. They might have done it after 1856.

EBENEZER ROBY.

WILLIAM CARLILE, a witness produced on the part of complainant, being duly sworn, deposes and says:

Direct examination by Mr. LEE:

Q. What is your name, age, residence, and occupation?

A. William Carlile; 6 College place, New York; occupation, mechanical engineer; 52 years of age.

Q. Have you ever had any experience as an engineer of steam-engines?

A. Yes, sir.

Q. Please state what certificates and qualifications you have in that regard.

A. Well, I have been all my life engaged in engineering. I have been fifteen years to sea as engineer, principally as chief engineer, and I hold both English and American certificates of mercantile marine—first-class certificates.

Q. Have you had any experience in relation to packings composed of rubber, either wholly or in part, for the purposes of engines?

A. Yes, sir.

Q. What kind of packings have you used for the stuffing boxes of piston rods in steam-engines?

A. Principally Tuck's packing.

173 Q. Will you state during what years your experience in that line extended?

A. Well, I commenced in 1860, and I continued to go to sea until the year of the exhibition—1876.

Q. During that period, between 1860 and 1876, do you know

whether or not it was a common expedient among engineers to use pieces of hose or pieces of belting composed of canvas and rubber or duck and rubber for the purpose of steam packing?

A. I never saw it done. I never heard of it being done.

Q. Suppose it had been a common expedient among engineers during that period, beginning in 1860, would it necessarily or not have come to your knowledge?

A. I think I would have been sure to have seen it.

Q. Will you please look upon Exhibit H and also upon Exhibit D and state whether or not during your experience as an engineer any such contrivances as they appear to be were in use among engineers having charge of steam-engines?

A. I have examined Exhibit H and also Exhibit D, and I never recollect having seen anything of the kind.

Q. Have you ever heard of the use of any such contrivances among engineers from 1860 down to 1876?

A. Never, sir.

Q. If it had been a common expedient among engineers to use such things as Exhibit H and Exhibit D state whether or not you would have known or heard of such a thing.

A. I think if it had been a common practice I should certainly have known of it.

Q. You speak of the use of Tuck's packing. Suppose a piece of Tuck's packing was too large for the stuffing box, what would be the practice of an intelligent engineer in order to fit it to the stuffing box?

174 A. He would unroll it and take off sufficient to make it small enough to go into the gland—into the stuffing box.

Q. Can you produce a piece of Tuck's packing such as you have used during your experience as an engineer?

A. Yes, sir; here is a piece.

The witness produces a section of Tuck's packing, which is offered in evidence and marked "Complainant's Exhibit Tuck's Packing No. 2."

Q. Will you please explain exactly how you would fit such a piece of Tuck's packing to a stuffing box in case the packing was too large for it? It will not be necessary to actually unwind it?

A. I should simply unwind it and tear off the outer rolls until I had reduced it to such a size that it would go into my stuffing box.

Q. State whether or not that would be the proper and workmanlike way of availing yourself of a piece of Tuck's packing that was too large for the stuffing box.

A. That I would consider the proper way of doing it. I have never seen it done in any other way.

Q. Suppose it was sought to fit the Tuck's packing to the stuffing box by cutting it off on one side, which side would an intelligent engineer expose to the piston rod?

A. I think he would put it into the stuffing box in such a way that the cut part should come in contact with the outside of the stuffing box and not in contact with the moving part of the rod.

Q. Would this practically have the effect to cause the wearing surface to be the same as if it had remained uncut?

A. Yes, sir.

175 Q. Suppose an engineer had two pieces of Tuck's packing, one of which was the right size for the stuffing box, so as not to necessitate any cutting, and the other of which was too large, so that it had to be cut in order to get it into the box, or reduced in size in the other way that you have mentioned, which would he use?

A. He would use the piece that did not require cutting.

Q. In other words, he would use the piece that was already of the right size?

A. Yes, sir.

Q. Are you accustomed to examining patents and mechanical drawings annexed thereto?

A. Yes, sir.

Q. Will you please look at the drawing of Tuck's English patent of 1854, No. 1865, and state whether it represents what you have spoken of as Tuck's packing, particularly specifying the figures thereof that you have had any personal knowledge of?

Defendants' Exhibit Tuck's English Patent of 1854 shown to witness.

A. I have examined Defendants' Exhibit Tuck's English Patent of 1854 and find that figure 1 and figure 2 are the only packings I have ever seen of Tuck's or used.

Q. Has your experience as an engineer been confined to English vessels?

A. No, sir.

Q. Upon what vessels have you acted as engineer—of what nationality?

A. Both American and English—United States and English.

Q. Sailing from what ports?

A. New York.

Q. And from what English ports?

A. The English vessels I have been on were all abroad—in Yokohama, Japan.

Q. And the American vessels from the port of New York?

176 A. New York.

Q. From Yokohama to where?

A. Different ports in Japan; Yeddo and Osaca, principally.

Cross-examination by Mr. LOWTHORP:

X Q. Did you first go to sea in 1860?

A. Yes, sir.

X Q. Where did you go then?

A. I went to Charleston, the first place I ever ran; from New York to Charleston.

X Q. How long was it that you were engaged in that?

A. Probably about a year.

X Q. Where did you go after that?

A. I went to Savannah, Wilmington, New Orleans; but I cannot remember the different times, because they changed me about from vessel to vessel.

X Q. When did you first go into the English mercantile service?

A. When I went to Japan.

X Q. That was when?

A. That was in 1872.

X Q. In referring to the Tuck's packing which you would reduce in size in order to introduce it into the stuffing box you refer to packing such as is shown in Complainant's Exhibit Tuck's Packing No. 2?

A. Yes, sir.

X Q. Did you ever, in reducing packing of that form, unwind sufficient of the enveloping duck to expose the core?

A. No, sir.

X Q. Why do you consider that it would be more workmanlike to place the cut side of a round packing of that character next to the side of the stuffing box rather than toward the piston rod when such packing is cut?

177 A. Because by so doing I would expose to the friction the part of the packing that was originally intended to be exposed to the friction, and the part that I consider to be a better rubbing surface than the sectional part would be.

X Q. Why would you choose for use in stuffing a box a piece of Tuck's packing, similar to that which you have testified to, which fitted exactly the place in which it was introduced, rather than a larger piece, which you would have to reduce in size in order to introduce it into the box?

A. Probably one reason would be it would take less work to do it.

X Q. That is about the only reason, is it not?

A. No, sir; I think it would wear better than if it was unrolled at all.

X Q. Why?

A. Well, when you unroll it you get it crooked, as it were; you get it different degrees of diameter, you may say; that is, you make it rough and uneven.

WILLIAM CARLILE.

MARSHALL D. DAVIDSON, a witness produced on the part of complainant, being duly sworn, deposes and says:

Direct examination by Mr. LEE:

Q. What is your name, age, residence, and occupation?

A. Marshall D. Davidson; my age is 48; residence, 108 St. James Place, Brooklyn; occupation, manufacturer of pumping machinery.

Q. Have you ever had any experience as an engineer?

178 A. Yes, sir.

Q. In relation to steam-engines?

A. Yes, sir.

Q. During what period did that experience extend?

A. Well, I have been practising engineering since 1857; at least,

acquiring the education of an engineer and practicing it during that time.

Q. Please state in detail what your experience has been and its extent.

A. I have been a sea-going engineer and contracting engineer on shore and manufacturing engineer and an engineer in the Government service during a portion of the war—superintending steam-vessels and going to sea with them.

Q. Upon what vessels have you had experience as an engineer?

A. Well, now, I don't know. I can't go through all the vessels that I have been to sea on. It is pretty hard for me to remember the names of them. I was in the Pacific Mail Steamship Company, and of course was ordered from one to another, and I can't go now and recall from memory. I was at sea in the steamship Montgomery, the first vessel I went to sea in as an engineer.

Q. State the date as nearly as possible.

A. That, I think, was either in 1857 or 1858. I can't tell which until I refer to a memorandum.

Q. State in a general way.

A. Well, I had service in eight or nine vessels in the Pacific Mail. I was there during two years and eight months, from 1859 until somewhere along August, 1862.

Q. Where was your next experience as an engineer?

A. Spofford & Tileston's employ; then in Charles Morgan's employ; then in the Revenue Cutter Service, from which I resigned in—I don't know whether it was in 1864 or 1865. Since that I have been practicing for myself.

179 Q. From what ports did you sail during that period down to 1864 or 1865, when you were connected with steam-vessels?

A. From New York and San Francisco and Baltimore.

Q. During that period, while you were actively engaged as an engineer, down to 1864, did you ever know of pieces of rubber hose or rubber belting being used for the purpose of packing the stuffing box of a steam-engine?

A. Not in my recollection, sir.

Q. Did you ever hear of such a practice as being a common expedient among engineers?

A. I cannot recall it now as a matter of recollection.

Q. From your general experience as an engineer, if such a practice of utilizing rubber hose or rubber belting had been a common expedient among engineers, would you have known of it?

A. I don't know what you mean by "common expedient," my dear sir. If it were a common idea I should think I would have known of it.

Q. I mean by "common" a usual or generally used expedient.

A. It never came within my knowledge—its use. I should say that it was not common up to the completion of the years of my service as a marine engineer.

Q. Please look upon Defendants' Exhibits D and H and say whether or not you ever knew or heard of any such contrivances being used to pack the stuffing box of a steam-engine?

A. I have used this material and I have used that. I have used them both.

Q. I refer to the whole thing together.

A. I am treating them as separate pieces. I have used that and I have used that.

Witness pointing to pure gum strips and to the strips of hose of Exhibit D.

180 Q. How did you use the pure gum strips?

A. Sometimes wrapped it with lamp wick or hemp—cotton wicking or hemp—and sometimes without any wrapping.

Q. When and how did you ever use this piece of cut hose that forms part of D—this slice of hose?

A. Well, do you regard that as a section of hose cut out? I am using that. It is a common thing. I bought that from the New York Belting and Packing Company, and used that in our pumping factory within the last three or four years.

Q. Then your answer in reference to the part of Exhibit D that is not composed of pure gum has reference to the use of what is known as the Gately packing, made by the New York Belting and Packing Company?

A. I do not know it by that name. I buy it sometimes of one supply-house and sometimes of another. We have bought it, however. The packing that I ordinarily use in my pumps is like Exhibit H with the rubber left off.

Q. The question that I particularly desired to ask you about was this: As to whether, down to 1864 or 1865, you had ever known of engineers using a combination like that shown in Exhibit D or Exhibit H, consisting of a piece of pure or elastic gum and a cut piece of hose or a cut piece of belting tied together with lamp wick?

A. No, sir.

Q. If the use of such articles had been a common expedient among engineers prior to 1865, within the term of your active employment as an engineer, would it, from the nature of your employment, have come to your knowledge?

A. Well, I should think so, sir. I couldn't say as to that positively.

Q. Was your experience in the profession such that you had knowledge of all those expedients which were common and general and usual among engineers?

181 Objected to as leading.

A. Well, your term "common and general," my dear sir, I don't know that I comprehend that; some engineers are men of expedient and make-shifts. I never heard of it—never knew of its being used. I have been in situations where we have been obliged to use our ingenuity to supply deficiency of stores existing on ship and make the best of what we might find.

Q. Have you ever had experience in the use of Tuck's packing?

A. Yes, sir.

Q. Do you understand mechanical drawings?

A. Yes, sir.

Q. Please look upon drawing annexed to Tuck's English specification of 1854, number 1865, and state whether among the figures thereof you recognize any Tuck's packing that you have ever seen or known to be in use.

A. I have used figures 1 and 2.

Q. Have you had any knowledge of the others?

A. No, sir.

No cross-examination.

MARSHALL D. DAVIDSON.

182 NEW YORK, *March* 5, 1885.

Met at the office of Turner, Lee & McClure, No. 20 Nassau street, at 11 a. m.

Present: W. H. L. Lee, Esq., for complainant, and F. C. Lowthorp, Esq., for defendants.

HENRY L. BREVOORT, being produced and sworn as a witness on behalf of complainants, in answer to interrogatories propounded to him, says:

Direct examination by Mr. LEE:

Q. What is your name, age, residence, and occupation?

A. My name is Henry L. Brevoort. I am 36 years of age. I reside in Brooklyn, New York, and am by profession an engineer.

Q. What experience have you had in the practice of your profession, and what experience have you had in giving testimony and acting as expert in suits relating to letters patent?

A. When I was a boy I worked in a machine shop, the principal work of which consisted in the construction of small engines for land and marine purposes. After this I owned a shop in New York for about five or six years. At this shop we made steam-engines, and did various kinds of mechanical work. After this I was principally engaged in designing machinery and making tests of steam-engines. For about eight or nine years last past I have been chiefly engaged in examining patents and patented machines, and during this time I have very frequently been called upon to testify as an expert witness in suits relating to patents and patented devices. I have been so called upon to testify in between three and four hundred cases.

183 Q. Have you read and do you understand the letters patent of Dennis C. Gately, dated January 26, 1869, No. 86296, and do you understand the same and the invention therein described?

A. I have very frequently read the patent inquired about in the question, and I think that I understand that which is there shown, described, and claimed.

Q. Have you examined and do you understand the several documentary exhibits that were put in evidence by the complainant and by the defendants in this case, including the Gately patent already referred to, and the Defendants' Exhibit MacLean Patent, Defendants' Exhibit McBurney Patent, Defendants' Exhibit Tuck's English

Patent, 1854; Defendants' Exhibit Tuck's U. S. Patent, 1855; Defendants' Exhibit Tuck's English Patent, 1852; Defendants' Exhibit Keirby Patent, 1865; Defendants' Exhibit Wise Patent, Defendants' Exhibit Keirby English Patent, 1866; and do you understand the stuctures therein described?

A. I have read the various patents inquired about in the question and all the documentary evidence which has been introduced by either party in this case. I think that I understand that which is described and shown by the various exhibits.

Q. Have you read and do you understand the testimony of the witnesses, Allen Magowan, William F. Harrison, William W. Smith, James F. Lever, and S. Lloyd Weigand, taken on behalf of defendants in this cause; and have you examined and do you understand the several exhibits referred to by the said witnesses and the exhibits offered in evidence in connection with their depositions and the several kinds of packing described and referred to by them; and have you read and examined and do you understand the evidence adduced thus far in this cause on behalf of the complainant?

A. I have read the testimony of the witnesses referred to, taken on the part of the defendant-, and I have examined and un-
184 derstand the exhibits introduced by them. I have also read the depositions taken on the part of the complainant herein, and I understand the various exhibits which are referred to in the depositions of the said witnesses.

Q. Please state what you understand to be the invention described and claimed in the Gately patent No. 86296.

A. The Gately patent No. 86296, dated January 26, 1869, describes an improvement in vulcanized India-rubber packing. The specification sets out by referring to a patent issued in 1859 to one McBurney. To get a thorough understanding of the Gately invention it is necessary to first understand the construction and the objects of the construction of the McBurney packing. This McBurney patent describes a packing made of alternate layers of canvas and rubber, the whole being vulcanized into one homogeneous mass. McBurney, in his patent, explains one important feature connected with his invention, and that is that the layers of canvas are to be cut bias, so that the strip of packing when finished will be sufficiently flexible to enable it to be bent around the piston rod and placed in the stuffing box with comparative ease, which would not be the case were the canvas cut along the line of any one thread. The packing, after it was thus made, was to be so used that the ends of the threads were exposed to wear—that is to say, were to be against the moving piston-rod surface. This McBurney packing, Gately says, possessed an insufficient amount of elasticity to operate satisfactorily in all conditions. The gland of the stuffing box, as I understand it, was not enabled to force the packing with sufficient tightness against the piston rod so that a tight joint should result. Gately's improvement consisted in the combination of this McBurney packing and a vulcanized-rubber backing of pure gum—that is to
185 say, gum free from layers of canvas—which backing was to lie between the portion of the strip of packing made in ac-

cordance with McBurney and the walls of the stuffing box itself. This backing Gately describes was to be vulcanized to the portion of the packing which was to be subjected to wear, and the whole was then to form one homogeneous mass, which could be put in and taken from the stuffing box as a single piece, the portion of the strip made according to the McBurney patent furnishing a wearing surface, the character of which never altered under wear, but always remained the same, the pure gum at the back furnishing an elastic backing which served always to keep the wearing portion of the packing in close contact with the rod when the said pure gum backing was pressed upon by the gland of the stuffing box. By this combination a new article resulted, to wit, one that presented the same character of surface under wear and one which had sufficient elasticity to make a tight joint, the union of the front and back portions of the strip of packing also serving to ensure the position of the packing in the box, which would not have been the case were the front and the back portions formed separately and placed as separate things in the stuffing box, for in such a case no one could have predicted exactly, except in the case of very large packing, whether the ends of the threads of the portion submitted to wear were in contact with the rod or whether by the pressure of the gland and the difficulty of putting the parts in the box the canvas layers were not so turned as to be themselves presented to the rod. The claim of the Gately patent is as follows:

"The combination, with a packing such as herein specified, of an elastic backing or cushion of vulcanized India rubber, substantially as and for the purposes set forth."

The packing specified in the claim is the packing described
186 in the McBurney patent. The cushion of vulcanized India rubber is set forth in the Gately patent as being vulcanized with or to such portion of the packing as was first referred to in the claim, and this, I understand, constitutes the article which the Gately patent describes and claims.

Q. Please compare the invention described and claimed in said Gately patent with the following letters patent offered as exhibits by defendants, viz:

Tuck's English patent, 1852,
Tuck's English patent, 1854,
Tuck's U. S. patent, 1855,
Defendants' Exhibit McBurney Patent,
Defendants' Exhibit Keirby Patent, 1865,
Defendants' Exhibit Wise Patent,
Defendants' Exhibit Kierby English Patent, 1866,
Defendants' Exhibit McLean's Patent, and with the inventions severally described therein, and state the result of such comparison.

A. In answering this question I will first take up the patents referred to in the question other than those granted to Tuck, and I will refer to the three Tuck patents last. The American patent of Keirby and the English patent of Keirby are substantially the same. They both describe a rubber core and braided or woven fibrous ma-

terial made or placed concentrically around such core, leaving the core in the middle of the cylindrical roll of the packing thus produced. Keirby in his American patent shows a wire run through the centre of the rubber core, but this in no way alters the packing so far as this inquiry goes. In both of these examples the rubber was used to give to the packing elasticity, and the woven material or textile material which surrounded the rubber was intended to furnish the wearing surface which was to be pressed in use against the rod. The packing shown by these two patents differs
187 from the Gately packing in that the structure is not so made that the wearing surface is entirely on one side of the strip of rubber which gives elasticity to the packing, but is in the centre of the portion which is to be subjected to the wear of the rod. Now, it is clear, I think, to any one that the fibrous or textile material which lies between the rubber core and the walls of the box is useless material, merely serving to fill up the box, and, as it is not subject to any wear, that portion which is against the rod may be worn almost to the rubber, while the portion between the rubber and the walls of the box remains in position without performing any useful function whatsoever, merely serving to fill up the box. One of the features of the Gately invention consists in locating the rubber which is to give the elasticity to the packing between the portion which is be exposed to wear and the walls of the box. Thus the maximum amount of wearing portion is provided, and the elastic portion is located where it will never be subjected to wear and where it will serve its functions even better than when located centrally to the portion submitted to wear. Neither of the Keirby patents show layers of canvas cut bias and so arranged in the packing strips that the ends of the threads are the parts submitted to wear, and neither of the patents show layers of canvas cut bias located so that the ends of their threads shall wear upon the rod and secured one to the other and to the rubber core by vulcanization, but, on the other hand, as the Keirby packings wear they are continually presenting surfaces having new characteristics to the piston rod.

Going next to the Wise patent of 1865, there is there shown a packing in every way similar to the Keirby packing, with the exception that outside of the canvas or other fabric an armor or exterior is provided, which takes the wear of the rod. All that I have said in relation to the Keirby packing can be repeated in relation
188 to the Wise packing, and with the additional point that it was intended with the Wise packing that the brass, copper, or other metallic exterior should be the wearing portion and should make the joint between the packing and the rod. It is manifest, I think, without further explanation that none of these patents, to wit, the Keirby patents and the Wise patent, show anything which bears upon the Gately invention except in so far as they do show piston packings which have neither the construction nor the same characteristics when used which are found in the Gately invention.

The McBurney patent of 1859 I have already referred to. This patent describes that portion of the Gately invention which forms

the wearing surface of the Gately packing, and this McBurney packing was one of the features utilized by Gately in his patented structure. It consists, as I have before said, of layers of canvas cut bias, secured to one another by vulcanized rubber, and so arranged that the ends of the threads of the canvas are subjected to the wear of the moving rod.

The McLean patent of 1867 was for a packing made up of two parts, one consisting of vulcanized rubber and the other of cork. It was manifestly impossible with such a combination to unite the front and back portions of the packing by vulcanization, as the cork wearing surface could not be made to adhere through the process of vulcanization to the rubber back; consequently the parts were secured by a metal strip, which was wound around both the cork and the rubber. When this packing was used first the metal strips were subjected to wear, and when they were worn through, then the cork took the wear of the rod, and when this occurred the rubber backing and the cork wearing portion were no longer secured one to the other, but were left in the box as separate and independent
189 pieces. In this packing, as in most of the other packings, the character of the wearing surface altered until such time as the two parts were left free in the box. When the packing was removed from the box it would come out in two pieces, one composed of the rubber back and the other composed of the cork front. It is clear that this patent does not show the Gately invention, as it does not show a packing having such a wearing portion as is specifically referred to in the Gately patent, and further from the fact that it is not a homogeneous thing, made one by vulcanizing the parts together, but is a compound article made up of several parts tied or secured one to the other by means which were of such a character that after a slight amount of wear they ceased any longer to perform the purposes for which they were originally intended.

This is exactly the opposite result from that which is obtained with the Gately packing, for this packing is made at the beginning and sold as one homogeneous strip, and it exists as such until it is rendered useless by extreme wear and taken from the box, even at which time it is still one thing, and not two separate pieces disconnected one from the other.

This disposes of all the patents referred to except the three patents of Tuck. These I will refer to in the order of their dates.

In 1852 Tuck patent describes canvas coated with rubber, unvulcanized, which canvas was to be rolled upon itself and used in a stuffing box in connection with rigid wearing surfaces, the object of the canvas being to force such surfaces into contact with the moving rod, or at least such was the principal office which the canvas was expected to perform. This patent, of course, does not show any one single feature of the Gately invention.

The English patent of Tuck for the year 1854 shows nine forms of packing, none of which are vulcanized. All the forms
190 practically consist of a rubber core and canvas rolled around such core. In some cases the core is located centrally; in some cases it is located at one side of the roll; but in all cases the

canvas is rolled upon itself or upon the core, and when the packing is in use and is subjected to wear the character of the surface of the packing presented to the moving surface of the piston rod is continually changing, part of the time a rubber surface being presented and part of the time a canvas surface being presented.

The American patent of Tuck for the year 1855, shows five different forms of packing which are in substance copies of five of the examples shown in the English patent of the year before. There is no vulcanization referred to in the patent, and the wearing surface is composed of canvas cut on the bias, but rolled around the elastic or rubber portion, which itself is saturated with rubber. The rubber core is not insisted upon as a necessity, but the patent says that it is used at times for the purpose of giving greater elasticity to the packing. The three Tuck patents all showed packing which was different in principle from the packing described in the Gately patent in suit, differing principally in that the wearing portion was of such a character that it was continually changing in its conditions during the wear of the packing, not as in the Gately invention, presenting continuously a surface to the rod having like characteristics. It is a feature of the Gately invention that the wearing portion of the packing is not formed by rolling canvas either upon itself or upon a rubber core, but is formed by layers of canvas secured to themselves and to the rubber back by vulcanization. In fact the Gately packing could not be made were it impossible to vulcanize rubber, whereas all of the Tuck packings are capable of being
191 made independent of vulcanization, their structure being such that the canvas is used as a binding or cementing means in connection with any adhesive compound to keep the packing together and to form the strips, whereas in the Gately packing the parts are kept together and in place purely and solely by reason of the fact that the rubber which enters into the composition of the packing has been subjected to the process of vulcanization, thus making the packing a homogeneous whole by reason of such fact, not a strip rolled up upon itself, and thus by such rolling kept together and made to retain its shape, form, and characteristics. It is perfectly clear, I think, that none of the patents referred to in the question show the Gately invention. McBurney, it is true, shows a portion of the combination or of the article which Gately patented, and MacLean shows a rubber backing; but with the exception of these two patents none of the features of the Gately invention are shown or described, and it is clearly my opinion that in none of the patents referred to in the question is the invention of Gately, as claimed in patent No. 86296, shown or described.

Q. Please compare the invention described and claimed in said Gately patent with the different styles or different kinds of packing described by the witnesses Allan Magowan, William F. Harrison, William W. Smith, James F. Lever, and S. Lloyd Wiegand, including those shown by the following exhibits referred to by said witnesses, viz: Complainant's Exhibit Tuck's Packing, Defendant's Exhibits "A," "B," "C," "D," "E," "F," "G," and "H," and state the result of such comparison.

A. As to the Tuck packing nothing more need be said, as the exhibit merely shows one of the well-known forms of the Tuck packing, as shown in the two later Tuck patents, with the exception
192 that the exhibit appears to have a vulcanized core. Taking the testimony of the various witnesses referred to in the question, the only structure that they describe used as a packing is illustrated by the two exhibits, one marked "D" and the other marked "H," the rest of the exhibits, "A," "B," "C," "E," "F," and "G," merely representing pieces of pure gum and pieces of hose cut up for the purposes of illustration and to show how the packings "D" and "H" were made. The witnesses described packing made by them consisting of a strip of pure gum and a strip of garden hose or rubber belting, cut to the appropriate size, united by lamp wick, and then placed in the stuffing box, the hose or belting, it is asserted, being so cut and so located in the stuffing box that the wearing surface was composed of the ends of the threads, by reason of the bias arrangement of the cloth in the hose or belting, the strip of pure gum being used between the walls of the stuffing box and this portion of hose or belting cut to form the front portion of the packing. Of course these two strips could not be united as a single piece, and could not well be put in the stuffing box as two separate pieces, and, as they had to be united in some way, the lamp wick, as shown in the exhibits, was wrapped around them. It is evident that this arrangement did not form at any time a single article united by vulcanization, but was two things tied together by a third thing, as in the case of the McLean packing, where rubber and cork had been tied together with metallic strips. Neither "D" nor "H" could be so united by vulcanization before used as to form a homogeneous article and thus when in this state constitute a single homogeneous manufacture; but, on the other hand, they were necessarily composed of three things—the pure gum backing, the piece of hose, and the lamp-wick wrapping. In packing stuffing boxes when
193 packing was not obtainable I have frequently seen hemp used, and I have seen various textile materials wrapped around a piece of rubber used, and probably "D" and "H" were no more than such uses, the object of the rubber being to get some elasticity in the packing, and the efficiency of the make-shift depending upon the wrapping which surrounded the rubber. This, I take it from my experience, was the thing which the witnesses described. They depended upon the lamp wick practically as the wearing surface, and used the rubber merely as an elastic filling, attempting by this make-shift to approach in a limited extent to the well-known Tuck packing, which, though not perhaps as good as the Gately packing, is still at the present day used, and is an efficient and useful packing. Although the witnesses describe with particularity the placing of the piece of cut belt or hose so that the ends of the threads were the parts subjected to wear, I take it that in practice not much attention was paid to how the rubber was placed inside of the wrapping of textile material, the object, as I before said, being in all cases to produce something like the old Tuck packing. In the case of such packings no one can tell without actual inspection how the hose or belt-

ing would be exposed to the rod, for in the strain of packing the box and screwing down the gland the belting or hose, if unattached by vulcanization to the rubber backing, might twist or turn, and thus, instead of the ends of the threads being exposed to the wear, the sides or rubber surfaces would be exposed, and it would be a mere matter of conjecture as to how the packing would actually operate if it was used at all after the lamp wick had been worn through its surface. It is clear that these old make-shifts or, as Mr. Wiegand calls them, "expedients" did not show the Gately invention, for they did not show a rubber backing of pure gum and a front wearing portion united by vulcanization to the back or elastic gum portion, so that a homogeneous article was
194 produced, but they did show something that Gately dispensed with, and which was common to the old packing, to wit, an elastic core and a wrapping of some textile or fibrous material around such core. If these examples, "D" and "H," can be called articles at all, they merely exist as such by reason of the fact that they have such textile or fibrous wrapping, while the essence of the Gately invention consists in dispensing with such material or wrapping and forming the article and making its various parts homogeneous and uniting them by the process of vulcanization, so that with the maximum wear to which the packing might be subjected the surface presented to the rod would be identically the same surface in character during the last day's use of the packing that it was during the first day's use. This feature can never be present in a packing which has coverings of textile material wrapped around the elastic portion of the packing; neither can it be present even if Gately's or McBurney's wearing portion and the elastic strip or backing are not united as a homogeneous whole by the process of vulcanization, for without this it is mere guess-work as to the positions of the wearing surface of the packing after the fibrous or textile material which united the parts has been worn away.

I notice that there is some testimony in this case relating to the cutting down or reducing the size of those forms of Tuck packing which have the rubber core located at one side of the canvas roll. I fail to see what bearing this has, for the reason that the packing of Tuck, if it was ever made and ever so cut, would merely be by the cutting operation brought to the condition to which it would be reduced by wear. Such cut surface would not as it wore away con-
tinually present to the moving rod a like structure of parts,
195 but the wearing surface would be continuously changing from one having certain characteristics to one having certain other characteristics, and the mere previous cutting of the packing would not make it any more closely resemble Gately's invention than would the wear of the like packing. In any case no uniform and homogeneous wearing surface would be presented to the rod as the packing wore away, but at times a surface of all rubber, at times a surface of all canvas, and at times a surface composed partly of rubber and partly of canvas would be presented to the rod, the canvas either presenting its edges and a rubber surface or presenting its edges and a rubber surface and its sides to the rod, thus differing

from Gately, where during the entire life of the packing a rubber surface of the same extent and the ends of the canvas threads are always presented to the rod and are always present in like proportions and having the same relations of parts one to the other.

From the above it seems to me clear that none of the old expedients testified to by the witnesses show anything more than a rough attempt at making some Tuck's packing. Certainly none of them show the Gately article constructed as described in the Gately patent.

Q. Assuming the existence, at a time prior to Gately's invention, of the devices described and shown in each of the letters patent other than the said Gately patent heretofore referred to in your examination, and assuming also the existence, at a date prior to Gately's invention of all the various kinds of packing referred to in the testimony of the witnesses called on behalf of the defendants, please state whether or not, in your opinion, the subject-matter of the Gately patent does not involve something more than mere mechanical skill.

A. Yes; I think it did involve something more than mere mechanical skill. Certainly Gately produced a new article. He
196 produced an article consisting of a homogeneous stuffing box packing having a wearing portion which was alike throughout when subjected to wear, and this wearing portion he combined with an elastic or springy backing of such a nature as to make the wearing portion of the packing efficient and useful; and he did this not by using a third element in the shape of canvas, lamp wick, or metal bands wrapped around the two parts, but he united the springy portion and the portion which is to be subjected to wear by the same means of union as was adopted to unite the layers of canvas themselves together, thus creating for the first time a homogeneous packing possessed of qualities which were not possessed by any packing before the date of Gately's invention—that is to say, it had a large wearing and oil-absorbing portion which presented the same surface or the same character of surface to the piston rod from the day the packing was first put in the box until it was removed. He gave to this portion which was subjected to wear the capacity of making a tight joint by locating between it and the walls of the stuffing box a highly elastic portion adapted to press the wearing portion in contact with the rod. He effected a union between the wearing portion and the elastic backing by means of vulcanization and without the use of additional substances or materials, which would have, if used, to be worn through before the true wearing portion of the packing was reached. He united the two parts, therefore, in such a way that the position of the packing in the box was assured and in such a way that the union was never broken by the wear of the piston rod upon the packing. The evidence shows and my own experience has taught me that the invention was one and the article was
such that there was a great demand for it; it commanded a
197 higher price in the market and was recognized as a substantially different thing from anything that had gone before it; consequently I think that invention was required to produce an ar-

ticle having such characteristics and such capacities. I do not mean to be understood as saying that Gately was the first man who made a packing which would efficiently pack a stuffing box, because he was not, but he was the first man to make this kind of packing, which was recognized as having advantages over other styles of packing which were in the market before Gately produced the kind described in the patent. I think this is conclusive evidence that what he did constituted an invention rather than consisting of a mere re-arrangement of old parts which would have involved nothing novel. On the other hand, what Gately did seems to me to have involved invention, producing a new article when compared with anything that had preceded it in the art.

Q. Assuming the existence, prior to the date of Gately's invention, of all the structures and packings referred to in the last question other than that described in the Gately patent itself, please compare Complainant's Exhibit Trenton Rubber Works, 1882, and Complainant's Exhibit Trenton Rubber Works, May 27, 1884, with the packing described and claimed in the Gately patent No. 86296 and state the result of such comparison.

A. I have made the comparison called for in the question. Referring to Complainant's Exhibit Trenton Rubber Works, 1882, I find that the packing which composes this exhibit is identically the packing of the Gately patent. The canvas is cut on the bias, the ends of the threads are exposed to the wear of the piston rod, the layers of canvas are united by layers of vulcanized rubber, and this front or wearing portion is vulcanized to a pure gum back-
198 ing which rests against the walls of the stuffing box, and which is adapted under the pressure of the gland to throw the wearing portion of the packing forward and in close contact with the surface of the moving piston rod; therefore this exhibit is identically the structure shown and described in the Gately patent.

Turning now to Complainant's Exhibit Trenton Rubber Works, May 27, 1884, I find that a little over half of this packing is constructed identically in accordance with the Gately invention, having the front wearing portion and the pure gum elastic back portion. There is a portion a little less than one-half the packing, which is constructed in every other way in accordance with the Gately patent, except that the canvas is not cut on the bias. The packing is made relatively stiffer by this departure from Gately's invention at this portion, and the packing is injured by such construction, but the remainder of the packing is identically Gately's packing, and, even as the packing is arranged, like surfaces, or surfaces of the same character, are presented to the rod throughout the entire wear of the packing in the box.

Cross-examination reserved.

Adjourned to March 7, 1885, at 11 o'clock a. m., at the same place.

NEW YORK, *March* 7, 1885.

Present: Counsel as before.

Direct examination of HENRY L. BREVOORT resumed by Mr. LEE:

Q. In a previous part of your examination you have used several times the expression "homogeneous" in connection with the Gately packing. Please state what you mean by that expression.

A. I have used that expression as expressing, or rather describing, a strip of packing, which, although composed of two things—canvas and rubber—was united by the process of vulcanization,
199 so that all its parts formed a single solid and completely united strip of packing.

Q. For what kinds of stuffing boxes and piston rods can the Gately packing be used with special advantage, as compared with other packing?

A. It is especially useful—that is, the Gately packing—for small stuffing boxes. Its great flexibility gives it an advantage in this regard.*

FRANK C. JONES, a witness on behalf of the complainant, being duly sworn, deposes and says as follows:

Direct examination by Mr. LEE:

Q. What is your name, age, residence, and occupation?

A. Frank C. Jones; age, 27; residence, New York city; occupation, superintendent of the factories of the New York Belting and Packing Company and mechanical engineer.

Q. Will you please look upon Defendants' Exhibits "D" and "H" and state if a stuffing box of a steam-engine was packed with a packing such as is shown in those two exhibits—that is to say, composed of a layer of elastic vulcanized rubber tied with lamp wick, or in any other suitable way, to a piece of vulcanized belting or hose cut as is shown in both of said exhibits—what would be the effect as to whether the piece of elastic rubber would adhere, on account of the heat of the stuffing box or otherwise, to the piece of belting or hose to which it is tied?

A. It would not adhere.

Q. Do you give that as a mere matter of opinion, or have you made it the subject of actual experiment?

200 A. I have made it the subject of actual experiment.

Q. From the general nature of India rubber and its properties, as you understand it from your experience in vulcanizing the same, what would be your opinion on such a subject?

A. My opinion would be that it would not adhere.

Q. Will you please produce the experiments that you have made in order to establish this fact?

A. These are the experiments. I produce four rings composed of rubber belting cut on the bias, and vulcanized rubber cut in strips

* For remainder of Brevoort's deposition see p —.

wrapped around it and tied with lamp wicking to keep them together.

Q. State, please, exactly in what condition they were when they were put in the stuffing box, as to each ring.

A. These were wrapped around and tied with lamp wicking to hold the vulcanized rubber to the back of it.

Q. Like Defendants' Exhibits "D" and "H?"

A. Substantially the same as that—the rubber strips—only this happens to be belting and that happens to be hose; the result would be the same. Then, after wrapping them with lamp wick, we put them in the stuffing box, breaking joints as is our rule in packing, and set up the stuffing box and ran them in an engine, where the steam pressure was a hundred pounds—a hundred pounds on the boiler; probably ninety-five on the engine. These ran for ten hours. When we put these rings in we took out our regular packing, or the sample of it, which was running for two months. These were running for ten hours—that is, a piece of the regular packing which we took out.

Q. That is the Gately packing, is it not?

A. That is the Gately packing; yes, sir.

201 The four rings of belting and the four rings of rubber backing referred to by the witness are tied together and offered in evidence and marked "Complainant's Exhibit Jones No. 1," and the piece of Gately packing referred to by the witness as having been taken out of the stuffing box after two months' use is also offered in evidence and marked "Complainant's Exhibit Jones No. 2."

Q. Did you make any other experiments besides the one exhibited in Exhibit Jones No. 1?

A. Yes; we made another experiment in our hydraulic pump by cutting the belting bias and tying the rubber back onto it. We had three—equivalent to three—rings; it is really only two; one of them is a double ring—two rings, then, we will say; we had two rings. In that instance the pressure carried on the boilers at the factory where this was tried was ninety pounds. These ran for ten hours. These rings were in the stuffing box—the steam-cylinder.

Q. And exposed to the heat incident to such a cylinder?

A. Exactly the same, only the steam-cylinder instead of driving an engine drove a pump.

Q. When the rings of Exhibit Jones No. 1, composed of elastic rubber and belting, were taken out of the stuffing box, what had become of the lamp wick?

A. The lamp wick was pretty well broken up, as is observed. Some of it will be observed sticking here, and in handling them they have all got broken apart; some of them still have it; it can be seen. These (producing other rings) were tied together with cotton threads, a little stronger than lamp wicking. We thought we would get them a little tighter, and the cotton thread can still be seen on it; it has embedded itself in the rubber, showing how tightly it was wound together.

202 Q. Were the pieces in the stuffing box subjected to pressure so as to force them together?

A. Yes; the stuffing box had to be screwed up pretty tight to keep it from leaking.

The specimens of rubber and belting tied together to form a packing, and described by the witness as having been used for the steam-cylinder of the hydraulic pump are offered in evidence and marked "Complainant's Exhibit Jones No. 3."

Q. Is ninety to a hundred pounds a high or a low pressure?

A. Well, it is rather a high pressure. A hundred is rather higher than we usually carried; eighty to ninety is the usual pressure; it depends upon the work, though, altogether. It would be hard to say. Eighty to ninety is a more common pressure than a hundred pounds.

Q. Do you remember what the temperature would be incident to a pressure of a hundred pounds?

A. Not without my tables. It would be pretty well up. It would be about 340 or 350, I should say, but I won't say anything without my tables; I cannot carry it in my head.

Q. What would be the temperature of vulcanizing rubber?

A. Well, for vulcanizing rubber of the consistency—such rubber as we have before us in the specimens—it would take all the way from 250 to 275 degrees

Q. Fahrenheit?

A. Fahrenheit, according to the length of time it was run.

Counsel for the defendants requests to have the cross-examination of this witness reserved to another day.

203 Counsel for complainant states that he does not feel justified in granting the request, and that he considers in unreasonable.

Counsel for defendant- states that, having no practical knowledge of the manufacture and the qualities of India rubber and being unaccompanied by any person who can inform him, so as to enable him to cross-examine the witness intelligently, he declines to cross-examine at this time, and reserves his right to make application to to the court for leave to cross-examine the witness at a future day.

FRANK C. JONES.

WILLIAM CRAIG, a witness on behalf of the complainant, being duly sworn, deposes and says as follows:

Direct examination by Mr. LEE:

Q. What is you name, age, residence, and occupation?

A. William Craig; I live in Brooklyn—592 Marcy avenue; I am sixty years old, and am an engineer by profession.

Q. Please state in detail your experience as an engineer and the extent thereof.

A. You mean the time?

Q. Yes. The time and place and circumstances, what vessels you were on, or anything else.

A. Well, I have had experience as an engineer for over thirty-two years now—about thirty-two years—that is, about 1852 in Spofford and Tileston's employ, running between New York and Charleston—that was my first experience—for a number of years. After that I went into what was called at that time the Mitchell Line, that ran between New York and Savannah. In the two lines together,
204 I was pretty near seven years in the two employs. I have had experience as an engineer in various capacities since then. I was in the United States Navy—chief engineer of several ships. Do you wish me to name them?

Q. You might as well.

A. In the Yazoo, Ashland, Monterey, Continental, R. R. Cuyler, and the Emily B. Souder and others. I am now United States inspector of steam-vessels.

Q. During the period of your experience as an engineer, and especially during the years prior to 1869, state whether or not it was a common practice among engineers to use pieces of cut-up rubber belting or rubber hose to pack the stuffing boxes of steam-engines. By rubber hose or rubber belting I refer to the hose and belting that is familiar in the market, composed partly of duck and partly of vulcanized India rubber.

A. You mean belting for driving machinery?

Q. Yes; that kind of belting.

A. Ordinary rubber hose—you mean ordinary rubber hose?

Q. And ordinary rubber hose, composed of duck and vulcanized rubber.

A. No; I do not know any common practice of anything of the kind. I never had occasion to use it in that way.

Q. Did any such practice at all come to your knowledge?

A. The only practice that I know particularly about is taking a piece of square rubber—I don't know that there was any round rubber at the time for the core of a piece of packing; it was something rather common—and wrap it with lamp wick or hemp for the purpose of getting it to the proper size; that is about the only practice that I know of that is common practice, and even that is very uncommon practice, from the fact of hemp being used prior to what is called Tuck's packing, and then when the Tuck's
205 packing came in, as a rule, there was always enough aboard ship to get along; if anybody wants anything extra, why they might take a piece of rubber and wrap it, the core of it, if it is necessary to do so; trouble was that was before people thought there was any advantage over what is called a hemp gasket.

Q. If it had been a common practice among engineers during the period stated to cut up rubber hose or rubber belting would you, from your knowledge of engineering, have heard of it?

A. Yes, sir. I think I would have known something about it if it had been a common practice. If I was cast away in the Sandwich Islands, or any of those places where I couldn't get back—but as a rule a ship going out or a vessel going out from a port she is generally supposed to take or does take as much packing as will last her in service until she gets back, and the consequence is it is

very seldom that an engineer is put to an expedient of that kind, although they may be, but I was never in that condition.

No cross-examination.

WILLIAM CRAIG.

FREDERICK H. RICKERS, a witness on behalf of the complainant, being duly sworn, deposes and says as follows:

Direct examination by Mr. LEE:

Q. What is your name, age, residence, and occupation?

A. Frederick H. Rickers; my occupation is machinist and engineer; my age is fifty-seven years old; I reside 126 Hall street, Brooklyn.

Q. Will you please state the extent of your experience as an engineer?

A. Well, sir, I have had twenty-five years' steady sea-going experience.

206 Q. On what vessels?

A. On most every one; not most every one, but on American vessels, English vessels, and Spanish vessels.

Q. Sailing from what ports?

A. From New York, New Orleans, Havana, Nassau, New Providence, Bermuda, and Vera Cruz.

Q. During the period of your experience as an engineer, and especially during the years prior to 1869, state whether or not it was a common practice among engineers to cut up belting or hose composed of vulcanized rubber and duck, by which I mean what is commonly known as rubber belting and rubber hose, for the purpose of packing the stuffing box of a steam-engine.

A. No, sir.

Q. State whether or not your experience was such that if it had been a common practice you would have known of it.

A. I would; yes, sir.

Cross-examination by Mr. LOWTHORP:

X Q. Will you please state the names of the Spanish vessels on which you served as an engineer?

A. Yes, sir; the Isabella.

X Q. Any more?

A. Yes, sir; there is another one, but I can't call her by name. We used to call her the Old Stunner. She was an American-built vessel, and was owned by Spaniards. Well, gentlemen, she was a blockade runner; that is it. She was under the Spanish flag. I may as well tell you I was a good square Confederate, and I want you to know it before you go any further.

X Q. What English vessels were you on?

A. I was on a boat called the Fox, one called the Mary Ann—the Mary Ann, the Fox, and another one I took to Halifax. Well, gentlemen, I have forgotten the name of her. There is three of those ships there.

X Q. English?

207 A. Yes, sir; they were English.

X Q. Will you please tell us when you were aboard those English vessels? Just state the time.

A. Well, as near as I can state it, it was between the years 1862 and 1865, sir.

X Q. Were you on them continuously?

A. Different ones; yes, sir.

X Q. Of those English vessels?

A. Of those English vessels; yes, sir.

X Q. From what ports did those English vessels sail and to what ports?

A. Nassau to Charleston; Nassau to Wilmington, North Carolina; Charleston, South Carolina.

X Q. What was the name of the vessel you took into Halifax?

A. Well, I am trying to think, but I declare I can't tell you. Well, there was another one called the Owl I was on also.

X Q. Was it the Owl you took into Halifax?

A. No, sir; I can't think of her name now.

X Q. When were you on the Owl?

A. I was on the Owl in the latter part of 1863.

X Q. Now, what American vessels were you on?

A. Well, sir, I have been on the steamship Circassian, steamship George Washington, steamship Montgomery—this I am giving you now since 1860.

X Q. Yes.

A. I have been on the steamship Magnolia, the steamships Texas, Mexico, Matagorda—well, sir, I don't know. There is more of them, but I can't remember them exactly. They belong to the Morgan Line of steamships.

X Q. All of them?

A. No, sir; the Texas, Mexico, Matagorda, Magnolia, and General Rusk, they belonged to the Morgan Line, running from New Orleans, Galveston, and to Indianola. The George Washington belonged to the Cromwell Line, running between here and New Orleans.

X Q. During what years were you on those American vessels?

208 A. Say from 1860 to 1870; between 1860 and 1870.

X Q. Between 1860 and 1870?

A. Yes; excepting the Morgan Line of ships—no; that was before 1860.

X Q. Before 1860?

A. Before the war; yes, sir.

X Q. Were you continuously on those American vessels between the years 1860 and 1870?

A. How is that, sir?

X Q. Were you continuously (all the time) on those American vessels between 1860 and 1870?

A. No; from 1860 to 1865 was during the war; then I was on an English ship.

X Q. Then it was only after 1865 or the latter part of that year that you went into the American service, merchant marine?

A. Yes, sir.

X Q. When were you on the Spanish vessels you speak of?

A. Well, I was on the Spanish vessels—I was on the Isabel in the first part of 1863.

X Q. And when were you on the other Spanish vessels?

A. On the Mexican—I was on them before the war.

X Q. Before 1860?

A. Yes, sir; I was in the Mexican service—a Mexican man-of-war, it was.

X Q. Then you were not continuously engaged upon these English vessels from the breaking out of the war until 1865?

A. I was; yes; English and Spanish.

X Q. The trips that you made upon these English and Spanish vessels were all what you would call short trips, were they not?

A. Yes, sir; the ship that I took to Halifax was called the Lark.

X Q. What positions did you hold on these various vessels?

209 A. Some of them first assistant, some of them chief engineer.

X Q. Where did you get your supplies of packing that you used on these vessels?

A. Get it in Havana; get it in Nassau.

X Q. Were you always able to get as much as you wanted of it?

A. Yes, sir; just as much as we wanted.

X Q. And always carried a full supply on board?

A. Well, as a general thing.

X Q. What kind of packing was it that you generally used?

A. Generally used Tuck's packing—that is, where we used steam, but, say, for the water end of a pump we used hemp packing.

X Q. What kind of Tuck's packing did you generally use?

A. The round one.

X Q. Did you ever use any other kind?

A. Yes, sir; I have used square.

X Q. Do you understand mechanical drawings?

A. Well, somewhat; yes, sir.

X Q. Where did you use this square Tuck's packing of which you speak?

A. Stuffing boxes; packing valve stands at times.

X Q. I mean on what vessels; do you remember?

A. No, sir; I do not.

X Q. Did you use it on any of these blockade runners?

A. I presume that I did.

X Q. Those supplies of packing that you used generally came from England, did they not?

A. Well, sir, that is something that I can't answer.

X Q. Did you always have on hand upon these vessels on which you were engaged packings of suitable sizes for use on the engine?

210 A. Sometimes we would have it too large, sometimes too small, sometimes just the size; it was endeavored when we ordered it to have it just the size.

X Q. When you had it too large what would you do with it?
A. Strip it.
X Q. Did you ever run out of supplies at times?
A. Oh, yes, sir.
X Q. Well, what would you ordinarily do in such cases as that?
A. Take some hemp, plait it up, and make a gasket out of it.
X Q. That was your ordinary expedient in those cases?
A. Yes, sir.
X Q. Did you ever adopt any other expedient?
A. Yes, sir; we used rope.
X Q. Anything else?
A. Well, no; not that I can think of—cotton wick; take cotton wick and plait that if it was a stuffing box we wanted to pack, or if it was too small we would take it and wrap it around.
X Q. Did you ever wrap cotton wicking around a rubber core?
A. I have taken pure gum, cut it very near the size I wanted it, and then wrapped it with cotton wick.
X Q. You have done that?
A. I have; yes, sir.
X Q. Have you ever adopted any other expedient for packing an engine?
A. Not that I call to mind.
X Q. Have you ever in this service seen any one else adopt any other packing that you know of?
A. No, sir. On board of a ship the man that is first assistant of the ship, he has the say what is to be used and tells the parties—the second assistant or whoever is doing the job—what to use.

211 X Q. How many of these vessels that you were on that you have named here were blockade runners?

A. Well, sir, the Fox was a blockade runner, the Owl was a blockade runner, the Mary Ann was a blockade runner, the Isabel was a blockade runner, and then there was one or two more that——
R. X Q. Did you ever get caught?
A. I was caught two or three times.
R. X Q. Were any of these blockade runners upon which you served ever captured by United States war vessels?
A. Yes, sir; the Mary Ann was captured; another one that I was on, the General Buckner, she was captured.
R. X Q. Most of this Tuck's packing which was used on these vessels was what was known as round packing, was it not?
A. Yes, sir; well, I say the most of it; whichever we had that come nearest to fit, why we would use it.
R. X Q. During the war you spent very little time in American ports, did you not?
A. No, sir; very little—that is, after 1862. After Memphis fell, then I went into the blockade-running.
R. X Q. You ran the blockade at both Wilmington and Charleston?
A. Yes, sir.
R. X Q. At any other places?
A. No, sir.

R. X Q. How many times did you run the blockade at Wilmington, North Carolina?

A. Five or six, seven or eight; somewheres along there. I never kept any particular account. At Charleston four or five.

R. X Q. They were the only ports you were in?

A. They were the only ports. I was captured once going into Mobile.

R. X Q. That does not count.

212 A. That doesn't count, and I was captured coming out of Wilmington, and that doesn't count.

Adjourned to March 14, 1885, at 11 a. m., at same place.

FREDERICK H. RICKERS.

NEW YORK, *March* 21, 1885—11 a. m.

Cross-examination of HENRY L. BREVOORT by Mr. F. C. LOWTHORP, counsel for defendants:

X Q. Are you familiar with the art of vulcanizing rubber?

A. I am, somewhat.

X Q. Describe, as nearly as you can, the process of vulcanizing rubber.

A. The rubber is ground with sulphur and with whatever adulterating materials are used. The resulting compound is then put into such molds as may be desired. The molds are put in a heater and are heated eight, nine, or ten hours, depending upon the compound and the article. The heats vary also with the compounds used and the articles to be made.

X Q. What is the effect produced upon rubber by vulcanization?

A. It is changed from a plastic mass, which has scarcely any elasticity, either, in the case of vulcanite, to a hard, horny substance, which is springy, or, in the case of soft rubber, to a mass which has lost its pasty condition and has become flexible and highly elastic.

X Q. In what condition is the crude rubber before grinding?

A. It is in the condition usually of lumps, varying from the size of a man's head to the size of a man's fist, on the exterior
213 surfaces dark; on the interior surfaces light; elastic, slightly sticky, and semi-translucent.

X Q. What is the mode of grinding it?

A. It is put between two rolls which rotate in opposite directions, one going at a slightly greater speed than the other. It is usually ground between three or four pairs of rolls, one after the other, the sulphur and the adulterants being mixed with it during the process of grinding, usually in a second set of rolls. The grinding is accompanied by heat.

X Q. When ground as you have described what is the condition or consistency of the mass?

A. This depends somewhat on the compound. It usually is a stiff, doughy mass, which comes from the rolls in sheets roughly formed, with irregular edges, and capable of being forced into molds. Dental rubber is not sticky to the same extent as soft rubber, and is usually of a little firmer consistency.

X Q. When this rubber is ground as you have described, is it plastic, greasy, sticky, or otherwise?

A. This depends somewhat on the compound. It is somewhat sticky; it is plastic, and usually has a grayish exterior, due to the admixture of the sulphur and the foreign materials, which generally are white, though in dental rubber either red or black materials are used.

X Q. What do you mean by adulterants?

A. Various powdered earths or oxides of metals, white oxide of zinc being the principal adulterant.

X Q. What is the use and effect of these adulterants?

A. They make the rubber go a longer way without practically injuring the mass for the purposes intended. They also give to the mass the color which is supposed to be the normal color, and which is customary in rubber goods. Sometimes they confer upon the compound new capacities, as in the case of the plumbago used in valve discs and the like.

214 X Q. What new quality or capacity does plumbago give to vulcanized rubber?

A. It enables efficient valve discs to be made; why I don't know.

X Q. Do you know what the qualities of a valve disc made without plumbago would be as contradistinguished from those made with it?

A. I do. I opened two valves once four thousand times in succession. One had a plumbago disc and the other did not. The one with the plumbago disc by far outlasted the one without the plumbago disc. I do not know why it should have done so, but it did. I think I am wrong in stating that one was entirely without plumbago. I think that it had a very small quantity.

X Q. Do I understand you that the only difference between the two discs you speak of, which you attribute to the use of plumbago, was the quality of imparting strength?

A. I do not know what it did.

X Q. Does the use of plumbago with rubber affect its adhesive properties in any degree?

A. I do not understand the question.

X Q. Will the use of plumbago with rubber make the rubber more adhesive than it naturally is without, or detract from that quality or lessen it?

A. Rubber is not adhesive in the sense I understand the question. When it is vulcanized it is not sticky, and it is not sticky when plumbago is used or when it is left out.

X Q. In what sense do you understand the question?

A. I understand that adhesive means that the rubber will adhere to other materials by contact after vulcanization.

X Q. Does or does not vulcanized rubber packing adhere to clean metallic surfaces—cast iron, for instance—in joints of steam-pipes when heated?

A. Sometimes it does and sometimes it does not. There are many

conditions which are necessary to adhesion; but at times, even
215 when the necessary conditions appear to be present to produce adhesion, the rubber does not adhere. I do not know why this is.

X Q. What are those necessary conditions, as you understand it?

A. I have made a large number of experiments in the manufacture of wringer rolls where the patent was for causing the adhesion of the rubber directly to the shaft of the roll without the interposition of any strings, pegs, or other mechanical anchors for the rubber. A successful manufacture of this class of roll is and has been carried on for years by preparing the shaft as follows: The cast-iron shaft is first turned until a perfectly fresh surface is exposed at all parts. This must never be touched by the hands. After this it is plunged in acid for a few minutes. The shaft is then varnished with rubber cement, and the vulcanizable compound is wrapped upon the shaft, and adhesion takes place practically in every instance, not one roll in five thousand coming back on the manufacturer's hands. This is one method. Another method consists in putting on an exceedingly thin film of copper upon the shaft, then wrapping the vulcanizable compound upon the shaft and vulcanizing it. When examined the copper will have disappeared, being affected by the sulphur of the rubber, and adhesion results in practice. If the copper is deposited in more than an exceedingly thin film no adhesion will result. Rubber will not adhere to a surface of copper presented in the shape of a rod or of a thick plate. These are the conditions under which rubber will adhere to metallic surfaces.

X Q. Are there any other conditions?

A. I do not know of any. These are the only two examples in the art that I know of where rubber is required to adhere with such tenacity to surfaces of metal, and where no mechanical anchoring or interlocking of the parts is used to secure the rubber and the metal together.

216 X Q. In procuring the adhesion of the rubber under such circumstances is the rod heated?

A. Only due to that heat which is used for vulcanizing.

X Q. Were these rods on which these rubber jackets were placed made of ordinary cast iron or what is known as malleable cast iron?

A. I do not recall that fact. I think they were malleable iron, but I am not sure. I know that this makes no difference, as I have used both.

X Q. Have you used both malleable and cast iron under similar conditions?

A. Yes; I have seen shafts which were made of malleable iron and shafts which were made of simple cast iron.

X Q. The original question was as to the adhesion of vulcanized rubber to clean surfaces of cast iron, such as in steam-pipe joints and heated. Have you or not in your experience found such gaskets or packings to adhere to the metal?

A. Yes; quite often.

X Q. Do you understand why vulcanized rubber will adhere to these metallic surfaces spoken of in those conditions?

A. Referring to steam-pipes and the like, where adhesion is not intentionally secured, I do not know why it does adhere unless it is that by a long-continued heating the surface of the metal has become slightly oxidized or undergone some transformation which enables the rubber to hold on to it. I have never heard any other explanation that seemed plausible.

X Q. Have you not known vulcanized rubber to adhere to metallic surfaces in stuffing boxes as well as in steam-pipe joints?

A. Yes; it will sometimes stick quite hard in a stuffing box.

X Q. Is ground rubber when in plastic condition of such consistency that it can be coated upon cloths as a cement?

217 A. It can be put on by what is called a friction machine.

X Q. When was it publicly known that rubber could be made plastic and cemented and heated so as to vulcanize the rubber?

A. At the date of the first Goodyear patent, which I have forgotten—somewhere in the forties—though it was claimed by an Englishman. Goodyear probably was the first inventor.

X Q. Are you conversant with the art of making rubber cement and rubber coating before the date of the first Goodyear patent for vulcanizing rubber?

A. Not specially. I have read about it and heard about it. I do not think that any rubber cements were made before the first Goodyear patent, other than those obtained by dissolving the pure gum in some material like naphtha or benzole and thus making a sticky cement. I know there are a number of patents that describe the use of such materials for waterproofing cloth and the like, but I do not think that much success was ever obtained with rubber in this condition, though a certain number of articles probably were produced from it.

X Q. Have you had any practical experience in such cementing?

A. I have used such cement in small quantities, but not on any extensive scale.

X Q. When and for what purpose?

A. Principally for microscopic use in making adherence between glass surfaces, rubber cement for this purpose being a favorite cement.

X Q. Have you used it for any other purpose?

A. Yes; I have stuck various things together with it.

X Q. What, for instance?

A. Pieces of pasteboard, wood on glass, cork, and things like that.

X Q. Did you ever undertake to cement any flexible or textile fabrics together with it?

218 A. I do not think I ever did. I never had such a requirement.

X Q. Is your practical experience, then, with rubber cement made in this way limited to the operations which you have specified?

A. Yes; cement made of pure rubber—pure gum.

X Q. Does or does not vulcanized rubber become sticky when exposed to heat with lubricating oils or greases?

A. Somewhat at times, and with some oils.

X Q. At what times?

A. I cannot lay down any general rule. Sometimes a packing will stick in a box, sometimes it won't. I suppose when the right condition in heat and some particular form of lubricating oil is used that adhesion results. It is an accidental matter, and I do not know that there are any well-ascertained rules regarding the conditions under which it will become sticky and under which it will not.

X Q. Are you speaking now of the use of such packings for the stuffing boxes of engines, cylinders, pistons, and so on?

A. I am.

X Q. Are or are not packings used in stuffing boxes of the kind spoken of exposed to both heat and grease or oils?

A. They are, and wear.

X Q. Would a test of ten hours of vulcanized rubber packing in the stuffing box of an engine be a satisfactory test, to your mind, for the purpose of discovering whether or not the vulcanized rubber would adhere to other surfaces in contact with it in the stuffing box?

A. Yes, so far as any adhesion due to vulcanization might be concerned. Of course, if it was left a longer time it might become sticky through disintegration, but if it was going to become sticky from this cause it ought to have shown it, I should think, in the time specified.

219 X Q. Would a test of ten hours be amply sufficient, in your opinion, for discovering whether or not the vulcanized rubber would adhere to other rubber surfaces because of disintegration?

A. I should think it would give an indication whether it was going to adhere or not. Of course, if it was used a longer time it might become stickier through the action of oil and the like.

X Q. What indication of adhesion would you expect to observe within the time named?

A. If in a case of two rubber surfaces I did not find adhesion at the end of ten hours I would conclude they never would adhere by reason of vulcanization. If they indicated no signs of disintegration I would come to the conclusion that, under the conditions specified they would not disintegrate except under very peculiar conditions which would apparently not be present.

X Q. (Question repeated.)

A. If I found the surfaces sticky I would conclude there was an evidence of disintegration, and consequently there might be some accidental adhesion.

X Q. Would or would not the character of the lubricant affect the adhesion or want of adhesion of the surfaces?

A. Possibly; some lubricants would cause disintegration more rapidly than others.

X Q. Can you state what lubricants would promote adhesion of the rubber parts and what would prevent it?

A. I cannot, except generally.

X Q. State generally.

A. Those lubricants which would tend most rapidly to destroy the rubber I cannot tell exactly which ones would have this effect in the shortest space of time.

X Q. If plumbago were used as a lubricant would its effect be to retard the adhesion of the rubber parts or to promote it?

220 A. I do not think it would affect it one way or the other.

X Q. What is the nature of plumbago?

A. It is a mineral.

X Q. As used as a lubricant, in what form does it come?

A. Powdered, mixed with oils, tallow, and grease, and I have seen it mixed with wax. I do not know that this would be a lubricant.

X Q. Is not plumbago a lubricant itself?

A. Yes. It produces a surface which seems to in some way diminish friction.

X Q. If plumbago were dusted or otherwise interposed between the surfaces of rubber, what would be the effect on adhesion?

A. None that I can recall.

X Q. Would not any mineral lubricant interposed between the layers of rubber prevent adhesion?

A. If there was enough of it I suppose it would, if vulcanization was attempted.

X Q. From your knowledge of the art of steam engineering, when did the practice begin of applying springs to enforce contact between the wearing surfaces of pistons in cylinders and the wearing surfaces of packing upon piston rods or plungers?

A. Somewhere back in the beginning of the century. I do not know when; long before my day.

X Q. Has not such practice been generally known in the art from an early date?

A. Very early.

X Q. State generally the methods of giving elasticity to these metallic packings as practiced before the year 1850?

A. I think the greater number of old patents would show some form of material which was forced out by the gland so that it squeezed the wearing material against the rod. I have no doubt that some persons have tried springs and the like for

221 stuffing-box packings, but I do not recall any at the present minute. For pistons, usually metallic springs have been used, though rubber and other elastic bodies have been placed behind the packing rings; steam itself was a favorite means of pressing packings outwards.

X Q. These packing rings of which you speak, behind which rubber was placed, were metallic rings, were they?

A. They were.

X Q. When commenced the use of rubber for springs to force contact of the wearing surface of the packings upon rods?

A. I do not know the date exactly. It must have been after the discovery of vulcanization, and probably some years after it.

X Q. This was done, was it not, as early as 1850?

A. Probably earlier.

X Q. What was the difference in function between the steel springs or metallic springs and the strips of rubber used to keep the wearing surfaces of these metallic packings against the rod?

A. There was no difference in function; each forced the packing to its work. There usually was a difference in operation, in that the rubber could be compressed in one direction and made thereby to press in another direction, while the springs of metal to be forced to press harder usually had to be pressed in the direction of the force which they exerted.

X Q. The pressure of the rubber vertically against the metallic packing was effected by the lateral pressure procured by screwing down the gland, was it not?

A. In the case of stuffing boxes, always.

X Q. Look at the Tuck's English patent of 1854, Tuck's United States patent, 1855, Defendants' Exhibit Wise Patent, and Defendants' Exhibit Kierby English Patent, 1866, and state what, if any, is the difference in function between the rubber cores or strips
222 depicted in those patents and the rubber backing used with the metallic packings of which we have spoken?

A. The rubber used in all these various patents is used for the same purpose—to force the wearing surface up against the rod—and in one of these patents I think a metal wearing surface is shown.

X Q. Is not the function of the rubber strip depicted and described in Defendants' Exhibit McLean Patent and in Complainant's Exhibit Gately Patent the same as the function of the rubber strips depicted and described in the patents referred to in the last question and answer?

A. The function in all the cases is to press the wearing surface against the rod.

X Q. That is the sole function, is it not, of this rubber strip or core?

A. Practically; yes.

X Q. When was the art of cementing textile fabrics by the use of vulcanized rubber first known?

A. I should think not very many years after Goodyear's discovery, which discovery was in 1844, or thereabouts.

X Q. Was this art not known and practiced as early as 1850?

A. I should think it was, but I do not know from any patents that I can now recall whether it was known at such a date.

X Q. (Tuck's English patent of 1854 being shown to witness.) Does not the inventor state in the specification of this patent, "I prefer that the flexible material should be that of canvas, coated or saturated with a solution of India rubber or other suitable composition, but this material may be varied"?

A. Yes; he did not confine himself to rubber.

X Q. Was not this India-rubber coating or saturating mentioned in the patent—a cementing of the folds together with rubber?
223 A. If rubber was used, yes; some form of rubber.

X Q. Why do you say "some form of rubber"?

A. Because I do not recall that any of the Tuck patents speak of vulcanized rubber.

X Q. The art of vulcanizing rubber and of cementing layers or laminæ of textile fabric together by means of vulcanization of rubber being known at the time of the issuing of said patent, would the fact that the term "vulcanized rubber" is not used in the patent necessarily preclude the idea that the packing described therein might be constructed by the cementing of the folds of canvas together by means of vulcanization?

A. I think probably; yes. Vulcanization was known at the time of the Tuck patents, and I notice that Tuck carefully avoids referring to the use of vulcanized rubber. I suppose there was some object in this.

X Q. What is your ground for thinking that Tuck carefully avoided the use of the term "vulcanized rubber"?

A. Simply because I do not find the process of vulcanization referred to in any of his patents as I now recall them.

X Q. This opinion of yours, then, is a mere surmise because you do not find that term "vulcanization" specifically mentioned in the patents, is it not?

A. In substance; yes; it is a surmise. I suppose if he had meant to use vulcanized rubber, which process was well known, he would have said so.

X Q. Do you wish to be understood as saying that in using the words "but this material may be varied" you are satisfied that Tuck did not mean that vulcanized rubber should not be used in this packing?

A. He evidently refers in the part quoted to the use of some material other than rubber, I think; at least, I so understand the terms.

X Q. You have drawn a distinction between vulcanized
224 and unvulcanized India rubber, and in so distinguishing it you have practically said that they were different articles. Are you prepared to state positively that you are satisfied that Tuck did not mean to use vulcanized India rubber under this term "but this material may be varied"?

A. I am satisfied that the terms quoted did not refer to vulcanized rubber. I should here say that vulcanized rubber, when compared with unvulcanized rubber, is the same material, but in a substantially different condition by reason of the admixture of sulphur and the addition of heat. This is the proper definition of the difference, as I understand it.

X Q. What do you understand by the use of the words "or other suitable composition," above quoted in Tuck's patent?

A. I suppose he may have referred to gutta-percha or some other material; possibly some made-up material.

X Q. What do you mean by a "made-up material"?

A. I mean some compound, as, for example, lard mixed with some stiffening material. I cannot tell precisely what material he means.

X Q. Now, then, speaking of a composition consisting of lard made up with some stiffening material, would not another composition be composed of India rubber with the materials in it used for vulcanizing, and vulcanized? Is not, in fact, vulcanized rubber a composition?

usually consist of vulcanized goods, but almost all of these stores have material which is not vulcanized.

228 X Q. The term "rubber goods," then, as commonly used, covers both vulcanized and unvulcanized goods, does it not?

A. It covers a store usually where both are sold.

X Q. Does not the public understand that the term covers both vulcanized and unvulcanized goods?

A. I suppose they do.

X Q. As a matter of fact, is not Tuck's packing, such as is described and shown in his patent of 1854, largely sold to-day prepared with vulcanized rubber?

A. Yes; some forms.

X Q. You say "some forms;" what do you mean by that?

A. I never saw any Tuck's packing for sale that was not like figure 1 or figure 2—the core usually being a round core.

X Q. Have you ever seen any Tuck's packing which was not agglutinated with vulcanized India rubber?

A. Not since my experience with such materials commenced—about 1864 or 1865.

X Q. Did you before that time?

A. Never.

X Q. Did you ever know or hear of any Tuck's packing made or used that was not constructed in this way with vulcanized India rubber?

A. Practically it has always been vulcanized, so far as I know.

X Q. Now, Mr. Brevoort, taking the Tuck's patent of 1854 and looking upon the drawings annexed to it, please state what you discover to be the difference between the part C shown in figure 9 and the part B shown in figure 4 and the part of the Gately packing composed of the lâminæ of cloth and rubber—in other words, the wearing part of that packing.

A. I find that in the Tuck packing in the two figures referred to the canvas is coiled upon itself as a centre, and this roll of canvas is the surface exposed to the wear of the rod. The result of

229 this is that surfaces having different characteristics are continually presented by wear to the piston rod.; first, it is a surface of cloth, then next a surface of rubber, then next a surface of cloth, and so on, here and there a layer of the edge of the cloth being presented. In the Gately packing I find that there is a surface of like character which is subjected to the friction of the piston rod from the moment the packing is put in the box and used until the time it is taken therefrom in a worn-out condition. In the Gately packing each layer of canvas is held to the rubber backing by a layer of rubber which is vulcanized, and which holds the canvas on each side of itself together, and which layer of vulcanized rubber extends back to and is vulcanized as a part of the rubber backing. No such thing is suggested or dreamed of in the Tuck packing, in which the backing of rubber is covered on each side by a layer of canvas practically coextensive with its wearing surface and is not joined to a wearing portion of the packing composed of horizontal layers of rubber and canvas, as is Gately's. In other words, in the Tuck

packing the layers of canvas are as much in the vertical plane of the rubber backing as they are in the horizontal, while in Gately's packing the canvas layers are all at right angles to the rubber backing when a cross-section of the packing is looked at.

X Q. Is this answer which you have given based upon your actual knowledge and experience in the wear of these respective packings, or is it with you a matter of theory simply?

A. It is not either in this case; it is a matter of comparison of two drawings and the structures shown by the drawings. I have used both Tuck's and Gately's packing, however.

X Q. In actual wear of these two packings is it not a fact that the surface presented to the rod is composed of the ends or surfaces of threads and India rubber in nearly equal proportions?

230 A. In Gately's packing it is, and it is always alike; in Tuck's packing it is not, and is never alike.

X Q. Do you wish to be understood as having found that a packing formed of laminæ of cloth saturated and cemented with India rubber, either vulcanized or unvulcanized, contains such distinct strata or laminæ as to present distinct alternations of rubber surface and surface of woven fabrics as wear progresses?

A. I do not quite know that I understand the question, but if I do I can state this: there is only one surface which can possibly be presented to wear in the Gately packing, and there are all sorts of surfaces that can be presented to wear as wear progresses in the Tuck packing.

X Q. Have you answered that last question from practical knowledge or from theory?

A. I have answered it from facts.

X Q. Facts which have come under your personal notice in the wear of packings?

A. Yes; I have packed engines with Tuck's packing and with Gately's packing, and I think Gately's packing is the best; and this is particularly true for small engines such as I have principally been operating with.

X Q. Look upon figures 4 and 9 in Tuck's patent of 1854 and state whether or not, as wear progresses, layers of cloth would be presented vertically to the wearing surface.

A. Yes; some would; some parts of the packing would have layers at right angles to the backing of rubber; some parts of the packing would have canvas parallel to the backing of rubber.

X Q. Assuming a piece of packing, similar to that depicted in figures 4 and 9, to be worn one-third of the way down or to be cut down before introduction into the stuffing box, what would be the practical difference between the surface so presented to the rod and that presented by the Gately packing?

231 A. The Gately packing would present a uniform surface and the Tuck packing would present a surface which was not uniform and which was continually changing as wear progressed.

X Q. What is the difference in function between the canvas part of the Tuck packing so worn, as described in the previous question, and the canvas part of the Gately packing?

A. The difference is this: that the Tuck packing is always liable to have some of the layers of canvas which are parallel with the rod rolled up by the action of the rod, making lumps and causing leakage, whereas with the Gately packing the edges of the canvas are always presented and a like wearing surface is always formed for the rod to bear against.

X Q. Is this answer based upon actual knowledge as to the qualities of the Tuck packing referred to as in use?

A. I have seen this happen to Tuck packing; I do not know how common it is.

X Q. Is it not a very uncommon thing?

A. I do not know; I have used more Gately packing than I have Tuck packing.

X Q. How much Tuck packing have you used?

A. I could not tell; we always used Tuck packing when I was in a mahine shop in Brooklyn, around 1868, 1869, and 1870, and I suppose I have packed a great many engines with it there; most of them were comparatively small engines; some of them were large engines. I did not see the engines used to any extent afterwards; we used Tuck's packing in the engine at the shop, I think, but I am not certain.

X Q. How many accidents of the kind spoken of can you remember in your experience?

A. I am sure I could not tell; they were not accidents; they were simply imperfections in the packing; but they were imperfections which I never heard of anybody's experiencing and never
232 experienced myself with the Gately packing; Tuck's packing will pack a stuffing box well, only Gately's packing will pack it better.

X Q. Then the difference between the Tuck's packing of 1854, just spoken of, and the Gately packing is in the degree of their respective durabilities, is it not, in your judgment?

A. The difference resides in the fact that the Gately makes a better and more certain packing than does the Tuck. This is my observation of the matter, and I think it is a little more flexible and easier handled.

X Q. Then, in your judgment, the only difference between the two is in the degree of their flexibility and their durability?

A. Their efficiency and their flexibility. I do not think of any other distinguishing characteristic. The Gately is better than the Tuck, as it always presents a like wearing surface to the rod.

X Q. Both the Tuck and the Gately packings are capable of making steam-tight joints, are they not?

A. They are.

X Q. And as a matter of fact is not the Tuck packing very largely used at this day?

A. It is.

X Q. And is a popular packing, is it not?

A. I should call it so.

X Q. Is it not true, as a matter of fact, that the operations of weaving and compactly cementing rubber saturated fabrics so dis-

pose of the threads and gum as to present a mottled surface of rubber and fibre after wearing, with the cloth surface parallel with the wearing surface?

A. I should not think so.

X Q. Is this a matter of opinion with you or of actual knowledge?

A. I think it is a matter of actual knowledge. I have seen Tuck's packing in a horrible condition.

X Q. What is the difference in function between the rubber backing in the Gately packing and the rubber core or backing in the Tuck packing, as shown and described in the patent of 1854?

233 A. There is no difference in that they both press a wearing surface against a rod. They differ in this, however, that in the Gately packing the rubber between the layers is vulcanized to and forms a coherent part of the backing, whereas in the Tuck packing it does not.

X Q. Could not McBurney packing, as shown and described in his letters patent, be made by cementing the canvas layers together with India-rubber solution or cement made in that way?

A. I think it could be. I think McBurney describes that his packing might be made without vulcanization.

X Q. Could not Gately packing be made by cementing a piece of McBurney packing, constructed of layers of canvas cemented together with India-rubber solution, to a strip of pure gum, and would not such a packing be capable of performing the functions performed by the Gately packing as made?

A. Something could be made in the way suggested; whether it would wear or not I do not know But I do know that it would not be Gately's packing.

X Q. Why?

A. Because, as I understand Gately, his packing is to be vulcanized.

X Q. Then do I understand you that the difference between Gately's packing and the packing such as I have described lies solely in the vulcanization of the packing?

A. That is one of the differences, and also in the vulcanization of the backing. This vulcanization makes the packing a coherent, strong, solid whole, the rubber and the canvas being firmly united, so that they can be dealt with as a single article or strip.

X Q. Would not a packing cemented together by India-rubber solution, as I have described, be dealt with in the same way? Would it not, in fact, be a concrete packing?

234 A. I doubt whether it would. I do not know, because I have never tried it.

X Q. Does the Gately packing perform any other function than that which would be performed by the elastic portion of Tuck's 1854 packing, combined with the McBurney packing?

A. If the McBurney packing was combined with a rubber back, vulcanized, and united firmly to the rubber which is between the layers and which is itself vulcanized, then in this way McBurney could be transformed into Gately.

X Q. (Question repeated.)

A. I have no other answer. Tuck's packing does not present any of these features, except that it has a rubber backing; it is not even vulcanized.

X Q. I am not referring to Tuck's packing. I am referring to the elastic element of Tuck's packing—the rubber core or strip. With this suggestion the question is repeated.

A. I have no other answer to make. I do not see how any other answer can be made. I have not denied, and nobody else has denied, that Tuck has an elastic core and an entirely different wearing surface from McBurney or Gately.

X Q. Is there any new or other function or third function performed by the Gately packing just referred to beyond the functions performed by the elastic portion of Tuck's packing of 1854 and the superior wearing surface afforded by the McBurney packing?

A. Yes; there is the fact that the parts were united by vulcanization, and the strip of packing is a single article instead of being composed of two separate portions.

X Q. If the two elements of the McBurney packing and the elastic element of Tuck's packing were united together into a concrete packing would it be the Gately packing?

A. Yes; one could take the rubber backing of Tuck and the wearing portion of McBurney and then vulcanize them together,
235 and in this way the Gately packing could be formed, so far as I can see.

X Q. Take Defendants' Exhibits "D" and "H," and please state what is the difference in function between the strip of hose or belting in each as used in those exhibits and the McBurney packing as used in the Gately packing.

A. The difference is that these are packings made up of three things, to wit, a strip of rubber, a piece of hose or belting, and a cotton wrapping. The cotton wrapping is the only thing that keeps the parts together; there is no vulcanizing of one part to the other; there is no union between the two parts except a third element, to wit, the string. There is no telling how these pieces would be in the box when squeezed by the gland, and there is no telling how they would come out of the box. They are merely make-shifts, and do not show the new article described in the Gately patent.

X Q. Do not strips of hose or belting and the strips of rubber tied together in "D" and "H" make a packing in each case—an entire packing?

A. They make something that can be used as a packing; so can a rope; so can almost anything; but they do not constitute an article which could be manufactured and sold.

X Q. They do in fact constitute a packing, do they not?

A. I should not suppose so, unless I had been told. As I said before, they might be used to pack a stuffing box.

X Q. What is the function of the lamp wick in these packings?

A. The lamp wick is to hold the bit of hose and the bit of rubber together until the material can be got in the box. Its function was either this or else it was intended to form a wearing surface.

X Q. You state in your direct examination that it is your
236 opinion that packings made in this way were made with an intent to approximate Tuck's packing. What is your ground for that opinion?

A. My ground is this: Everybody knew who had seen Tuck's packing that a very good packing was made by wrapping textile material around an elastic core, and I take it that these old packings were attempts to imitate in a make-shift way the better article known as Tuck's packing.

X Q. Your opinion, then, is based upon the supposition that these make-shifts were resorted to only with a knowledge of Tuck's packing and not of the particular wearing surface or of the qualities of the particular wearing surface which would be presented to the rod in the rubber hose or belt, is it not?

A. I do not believe that the question of the particular surface of the rubber hose or belt that was offered to wear was at the time these packings were made a matter of thought.

X Q. Have you ever improvised packings yourself?

A. Yes.

X Q. In doing so has it not been one of your objects to make a packing which, while efficient, could be made readily and quickly from the materials at hand?

A. Yes.

X Q How, then, do you account for a practical engineer taking the trouble to cut strips from a hose or belt and place them together with a strip of pure gum or rubber, when by cutting one strip of belting alone of a proper size, or by cutting one strip of pure gum of a proper size, or taking two strips of the same material which might come handiest and wrapping them together with lamp wick, he could produce an article which would just as closely resemble Tuck's packing as the Exhibits "D" or "H"?

A. I presume there was either not enough hose to go around or not enough pure gum to go around and both were used, or
237 else it was thought that pure gum was too valuable to be wasted in a location where a piece of any semi-yielding material would be equally efficient.

X Q. Does the Exhibit "H" remind you in any way of Tuck's packing?

A. Dimly. It has got some of the textile material wrapped around it. It is a sort of a poor attempt at Tuck's packing. Now, Exhibit "D" is a considerably better attempt. There a sufficient amount of lamp wick is shown to do some good. I do not think that "H" suggests anything that I ever saw or heard of.

X Q. Are not the necessities of the Gately packing the cause of your supposition above stated in regard to the reason and end in view in making the Exhibits "D" and "H," as you suppose?

A. No; because if anybody had shown me "H," and I had never heard of the Gately packing, I should have got another ball of lamp wick and given it a decent wearing surface instead of attempting to wear it partly against lamp wick and partly against a piece of hose.

X Q. Is not your statement as to the intent of the persons making the Exhibits "D" and "H," or packings similar thereto, made merely upon your own, supposition, without any knowledge of the persons making them or the circumstances under which they were made?

A. I have read the testimony as to the circumstances; of course I was not there, and I can only draw an inference from what I have read and the things themselves.

X Q. You know nothing of the men who made them, do you?

A. No.

X Q. Your statement as to the action or the shifting of position, of the uncertainty of the position of the strip of hose or belting, as shown in the Exhibits "D" and "H," when in actual use,
238 is based merely upon supposition, without any knowledge of the practical working of them, is it not?

A. Yes; I have never tried to work packing made like either Exhibit "D" or Exhibit "H."

Redirect examination by Mr. LEE:

R. D. Q. Have you ever experimentally made any packing like that which is shown in the drawings of Tuck's English specification of 1854?

A. I have. I made some in about 1875, I think, like figure 9. I made a few feet of it. It was either three-quarters of an inch or an inch square. It differed from Tuck's packing in that it was vulcanized. It was useless; it was so stiff that you could not bend it around a rod in any way so that it could have been used in practice.

Recross-examination by Mr. LOWTHORP:

R. X Q. Is it not possible by vulcanization to make rubber so hard that it will not bend or be flexible at all?

A. It might be; but this vulcanizing was properly done, I know, for I cut the packing open. I wanted it good.

HENRY L. BREVOORT.

239 United States Circuit C't, District of New Jersey.

NEW YORK BELTING AND PACKING COMPANY
vs.
ALLAN MAGOWAN *et al.* } On Bill, &c.

By NIXON, *D. J.*:

Letters patent No. 86296, for "improved vulcanized-rubber packing," were granted to the complainant corporation, as assignee of Dennis C. Gately, on January 26, 1869, and this suit is brought to recover profits and damages for their infringement.

The answer of the defendants—

1. Denies infringement;

2. Alleges that Gately was not the original and first inventor of the thing patented; and,

3. Claims that the letters patent are void (*a*) because the single claim is too broad, covering more than Gately invented; (*b*) because the specifications fail to sufficiently distinguish between what was novel and what was old in the art; (*c*) because, in view of the state of the art at the date of the issue of the patent, no invention is exhibited and shown.

The defence of non-infringement was not well taken, not being sustained by the evidence. The packing manufactured by the defendants in 1882 and 1884 were exhibited. The first was an
240 exact counterpart of the complainant's product under its patent, and the second was a feeble attempt at evasion by having only the central part of the inner surface of the canvas, next to the piston rod, cut bias.

The other defences, which may be fairly grouped under the single allegation of want of patentability of the invention in view of the state of the art, have caused more difficulty and required more careful examination.

In the specifications of the patent the inventor states that his invention relates to packing of the kind for which letters patent were issued to Charles McBurney on June 28, 1859; that the defects of the McBurney invention *was* that the packing was not sufficiently elastic to maintain a tight joint between it and the piston, and that he has secured this greater elasticity by "firming the packing with a backing of pure vulcanized rubber, which may be covered and protected by a strip of canvas or other suitable fabric." He claims that when a packing thus firmed is placed in the stuffing box and around the piston and the follower is screwed down so as to compress the packing the rubber strip will also be compressed and forced against the sides of the stuffing box, and as it cannot expand in the direction of the follower it acts as a spring to hold the packing against the piston rod and to prevent leakage, compensating for any slight wear in the packing and making a tight joint between the rod and the packing.

The claim of the patent is—

241 "The combination, with the packing such as herein specified, of an elastic backing or cushion of vulcanized India rubber, substantially as and for the purposes set forth."

It is quite clear from these specifications that the patentee conceived that he had remedied the defects and made an improvement upon the then existing McBurney patent. Turning to that patent, we find that it was granted on June 29, 1859, for an "improvement in packing for stuffing boxes of pistons." It was claimed by the inventor to be a durable substitute for the hempen packing before employed in stuffing boxes, more easily adjusted to produce an uniform pressure upon all sides of the piston rod; but in practical use it fell short of accomplishing what the patentee claimed for it.

Frequent complaints came from the purchasers to the manufacturers that it was too stiff and rigid and was not compressible enough to make a tight joint in the stuffing box. Gately, the patentee, who was the superintendent of the complainant corporation, set himself to the task of overcoming the defects. He made several experi-

ments, and the result was the patent on which the suit is brought. He added to the McBurney packing the elastic backing or cushion of vulcanized India rubber, which not only rendered the whole more compact and more elastic, but, being compressed between the follower and the sides of the stuffing box, acted as a spring to
242 hold the packing continuously against the piston rod, thus making a tight joint, which had not been attained under the McBurney invention and was not shown to have been so well accomplished under any other patent.

Whether a thing devised is due to the genius of an inventor or to the mechanical skill of a workman is often a difficult question to determine. The line between them is not always clearly drawn. Invention indicates genius and the production of a new idea. Mechanical skill is applied to an old idea and suggests how it may be modified and made more practical, and according to Smith *vs.* Nichols, 21 Wall., 112, such mere modification is not patentable unless some new and useful result is secured.

The complainant's patent is nearly on the line dividing invention from mechanical skill. But after carefully comparing it with the exhibits, which are put in to show anticipation and its lack of patentability, I am of the opinion that the combination reveals invention, not so much because the packing is more elastic by reason of the addition of pure hard rubber, but because the patent discloses a new and better method of obtaining a tight joint between the packing and the piston rod than has been obtained by any other combination of elements, new or old.

It is a fact not to be overlooked, and has much weight, that the product manufactured under it went at once into such extensive public use as almost to supersede all packing made under other methods.

243 Such a fact is pregnant evidence of its novelty, value, and usefulness, and accounts for the def'ts' infringement.

Let a decree be entered in favor of the complainant and for an account.

(Endorsed:) U. S. circuit ct. N. Y. B. & P. Co. *vs.* McGowan *et al.* Opinion. Filed Feb. 18, 1886. S. D. Oliphant, clerk.

244 At a term of the circuit court of the United States of America, for the third circuit and district of New Jersey, held at Trenton, N. J., on the 5th day of March, 1886.

Present: The Honorable John T. Nixon, district judge.

THE NEW YORK BELTING AND PACKING COMPANY, Complainant, *vs.* ALLAN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN, Defendants. } In Equity.

This cause came on to be heard at the March, 1885, term of this court, and was argued by counsel; and thereupon, upon considera-

tion thereof, it was ordered, adjudged, and decreed as follows, viz. (having been held under advisement until the September, 1885, term of this court):

That the letters patent No. 86296, dated January 26th, 1869, granted to the complainant, as assignee of Dennis C. Gately, for "improved vulcanized rubber packing," was a good and valid patent; that said Gately was the original and first inventor of the improvements therein described and claimed, and also that the said
245 defendants have infringed upon the said patent and upon the exclusive rights of the complainant under the same as the owner thereof.

And it was further ordered, adjudged, and decreed that the complainant do recover of the defendants the profits, gains, and advantages which the said defendants have received or which have arisen or accrued to them from said infringement of the said patent by the manufacture, use, or sale of the improvements described and secured by the said letters patent No. 86296 since January 26th, 1869, and also such damages in addition to said profits as the complainant may have sustained by reason of said infringement.

And it was further ordered, adjudged, and decreed that the said complainants do recover of the defendants its costs and charges and disbursements in this suit, to be taxed, including all the expenses of the reference, as to profits and damages, hereinafter directed.

And it was further ordered, adjudged, and decreed that, the counsel of the respective parties asking for it, it be referred to S. D. Oliphant, Esq., one of the masters of this court, residing in the city of ——, to ascertain, take, and state and report to the court an account of the gains, profits, and advantages which the said defendants have received or which have arisen or accrued to them since January 26, 1869, from infringing the said exclusive rights of the said complainants by the manufacture, use, and sale of the said improvements patented in the said letters patent, and also what damages in
246 addition thereto the complainants has sustained by reason of said infringements, leaving all questions as to increase of damages until the coming in of the report of said master.

And it was further ordered, adjudged, and decreed that the complainants on such accounting have the right to cause an examination of said defendants *ore tenus of* otherwise, and also the production of the books, vouchers, and documents of the defendants, and that the said defendants attend for such purpose before said master from time to time, as said master shall direct.

And it was further ordered, adjudged, and decreed that a perpetual injunction be issued, strictly commanding and enjoining the said defendants, their clerks, attorneys, servants, agents, and workmen, under the pains and penalties that may fall upon them and each of them in case of disobedience; that they forthwith desist from using or selling any vulcanized rubber packing made or manufactured prior to the 26th day of January, 1886, substantially involving or embracing or manufactured in pursuance of the invention described and claimed in said letters patent No. 86296.

JNO. T. NIXON, *J.*

246½ [Endorsed:] U. S. circuit court, district of New Jersey. The New York Belting and Packing Company *vs.* Allan Magowan, Spencer M. Alpaugh, and Frank A. Magowan. Decree for injunction and account. Turner, Lee & McClure, sol'rs for complainant, 20 Nassau street, New York. Filed March 5, 1886. S. D. Oliphant, clerk.

247 U. S. Circuit Court, District of New Jersey. In Equity.

THE NEW YORK BELTING & PACKING COMPANY *vs.* ALLAN MAGOWAN *et al.* } On Bill, &c. Accounting Before Master, &c.

In pursuance of a decretal order in the above-stated cause, of March 5th, 1886, by which it was referred to the undersigned to ascertain and state an account of the damages resulting to the complainant from the infringement of the exclusive rights of the complainant by the use of the improvement and invention patented in letters patent No. 86296, dated January 26th, 1869, granted to the complainant, as assignee of Dennis C. Gately, for "improved vulcanized rubber packing," upon which this suit is brought, and the gains profits, and advantages which the defendants have realized by the use and employment of the said infringement, and to report thereon to the court—

The undersigned master, to whom the matter was referred, respectfully reports that he has been attended by counsel for the complainant and defendant from day to day; that he has taken and carefully examined the testimony taken and herewith presented to the court, and thereupon finds and reports as follows, to wit:

248 The complainant waives and abandons any and all claims for damages.

For the goods manufactured and sold by the defendant prior to November 15, 1884, there seems to be little, if any, dispute or difference between counsel.

For the goods manufactured and sold subsequently to November 15, 1884, they are very wide apart.

The amount of goods manufactured and sold prior to Nov. 15, 1884, and the amount received for them appears in two of the defendants' statements, filed June 15, 1886, and marked "Complainant's Exhibit Statement;" Oct. 11, 1886, marked "Complainant's Exhibit Supplemental Statement No. 2." These two statements purport to embrace all the goods sold by the defendants subsequent to Nov. 12, 1884.

These statements, supplemented by the evidence of the def'ts' book-keeper, Mr. Collins, June 28, 1887, master's record, show that the defendants sold prior to Nov. 15, 1884, twenty-seven thousand seven hundred and sixty-seven (27,767) pounds of infringing packing, and received therefor the sum of ten thousand one hundred and thirty-one and seven-hundredths (10,131.07) dollars.

The cost of manufacturing, &c., this material is shown by the

evidence of Frank A. Magowan, Nov. 23, '86, Dec. 6, '86, and Dec. 24, '86, master's record.

The packing is composed of two parts, the elastic gum back and the cotton fabric, duck, about three-eighths parts by weight being the rubber back, and five-eighths the cotton fabric.

249 The same witness proves, Dec. 6, '86, master's record, that the rubber back cost four cents per pound, and it appears at the close of the def'ts' statement, filed with the clerk in the main case Nov. 17, '86, that the cost of manufacturing the infringing goods is embraced in five items, to wit:

Rubber cement and applying same, three cents per pound	3
Vulcanizing and making same	$3\frac{1}{2}$
Handling and selling same	$1\frac{1}{2}$
Waste in manufacturing	$\frac{1}{4}$
Total per pound, cts.	$8\frac{1}{4}$

Considering the two items, then, as suggested by compl't's counsel, in eight-pound packages, the following result is obtained, to wit:

Three pounds of elastic backing at four cents per pound	12
Five pounds of fibrous portion at $10\frac{1}{2}$ cts. per pound	$52\frac{1}{2}$
Total cost of eight pounds	$64\frac{1}{2}$
Divide this by eight gives	$8\frac{1}{16}$
as the cost of one pound, exclusive of miscellaneous; and adding these miscellaneous expenses, as above	$8\frac{1}{4}$
set forth, gives	$16\frac{5}{16}$

cents cost per pound.

250 The number of pounds sold prior to November 15, '84, appearing to be 27,767, at the above rate of $16\frac{5}{16}$ per pound gives a total cost of $4,529.35.

And the accounts show that the am'ts rec'd by the def'ts for the 27,767 pounds was		10,131 07
Less the aggregate cost above stated		4,529 35
Leaves a profit of		$5,601 72

which the complainants' seem to be entitled to recover from the defendants for the period of infringement, prior to Nov. 15, 1884.

Considering the goods sold subsequently to Nov. 15, '84, it appears from the evidence of Collins, def'ts' book-keeper, June 28, '87, and statements filed in the main case and made exhibits by the compl't in this counting, that 23,716, including a quantity belonging to the period prior to Nov. 15, 1884, in the years '82, '83, and '84, overlooked and omitted from a previous amount, were sold subsequently to Nov. 15, '84, for which the def'ts received the sum of seven thousand three hundred and forty-one and $\frac{85}{100}$ (7,341.85) dollars, and a calculation on the same principles as applied to the first period gives the following result, to wit:

23,716 pounds of packing		7,341 85
" cost of manufacture and sale @ $16\frac{5}{16}$		3,868 08
Leaving a profit to the deft's of		$3,473 77

251 The complainant contends that this am't last above stated, for the period subsequent to Nov. 15, '84, and during the lifetime of the patent, should be added to the profits, $5,601.72, found for the first period, making a total sum of $9,075.49 profits—

First, because the several statements filed during the pendency of the cause estopped the defendants from any benefits to be derived from the averments in relation to Exhibit Z, attached to the account presented to the master June 15, '86, and marked Compl't's Exhibit "Statement" and Def'ts' Exhibit, Ap'r 29, '84, even if Exhibit Z does not infringe the pl'ff's patent.

Second, because the goods sold during the second period, even if in fact they were like Exhibit Z, do infringe the complainant's patent—see testimony of witness Roby, June 28, 1887, master's record—and that the defendants filed statements on oath during the pendency of the suit, admitting that they sold infringing packing subsequently to Nov. 15, '84.

In answer to this it is claimed by the defendants that the statements filed in the main case from time to time contained mistakes, which the witness, Frank A. Magowan, corrected in his evidence before the master, and statements filed in pursuance of master's orders in the accounting, and that these corrections are further corrected and sustained by the evidence of Allen Magowan before the master April 29, 1886, master's record; that although the statements

252 of the witness, Frank A. Magowan, may appear to be contradictory, there is no contradiction of the testimony of Allen Magowan; that a mistake by one of the defendants should not weigh against the interests of the other partners; that the Complainant's Exhibit Z, attached to statement filed June 15, 1886, was not before the court in the main case, and that there was in fact no infringement of the complainant's patent after the 15th of June, 1884.

The master submits that it is hardly possible to reconcile the statements filed from time to time in the main case with the statements presented to the master in this accounting and the evidence of Allen Magowan, April 29, 1886, master's record.

It can hardly be questioned but that a witness may return to the stand and correct an error in testimony previously given, but the correction and explanation should be clear, full, and explicit, and, in fact, explain itself in connection with the error to be corrected, especially so when the subject-matter of the mistake is a matter of record, such as the daily entries in books of account of a large and well-conducted manufacturing establisliment.

It has been decided by the court that the defendants have infringed the complainant's patent, and it is the province of the master to find and report to the court the extent of the infringement.

253 The bias cut of the cotton fabric in the packing seems to be the gist of the patented improvement, and has been so treated by the court and counsel.

Now, referring to the evidence of Allen Magowan, he says, among other things, Master's Record, April 29, 1886, page 7, between and including questions and answers 4 to 8, that they made packing like Exhibit May 27, 1884, from the time they began to make any kind of packing until they were notified that they were infringing; that after the notice they made packing like Def'ts' Exhibit April 29, '86, and that all the plies of duck were cut straight and not bias after that date.

Applying this evidence and comparing this exhibit with the June 15, '86, statement and Compl't's Exhibit Z attached thereto, the statement and the evidence last above recited seem to sustain each other, and the exhibits seem to be of the same structure.

With the aid of a strong glass the master is not able to find that every thread of the woof is cut in Exhibit Apr. 29, '86, and that but one thread of the woof is cut bias in Exhibit Z. But Exhibit Apr. 27, '86, is only two and one-eighth ($2\frac{1}{8}$) inches long, while Exhibit Z is two and five-eighths, $2\frac{5}{8}$, inches long.

If Exhibit April 29 was as long as Exhibit Z would it show one thread cut, and is a bias cut of one thread in a line of less than three inches an infringement of the patent?

254 A bias cut at an angle of 45 degrees to the line of the web of cotton cloth or duck will cut a greater number of the threads of the woof than any other, and the more acute the angle the smaller will be the number of threads cut. A perfectly straight line will not cut a single thread of the woof, assuming that the threads of the web are perfectly straight.

To what extent, then, may the principle secured and patented by the patent be infringed with impunity and subject the infringer to merely nominal or no compensation to the patentee?

From and on the foregoing the master submits the following, finding for the complainant the sum of nine thousand and seventy-five and $\frac{49}{100}$ dollars, with interest from the confirmation of the report, as follows, to wit:

Profit to the def'ts on 27,767 pounds of packing sold prior to Nov. 15, 1884	5,601 72
Profit to the def'ts on 23,716 pounds of packing sold subsequently to Nov. 15, '84, and within the lifetime of the patent	3,473 77
Total	$9,075 49
Less the sum of	48 83
To correct an error in addition in one of the statements filed by the defendant-, giving net	$9,026 66

255 profits to be paid to the complainant.

If the court should be of the opinion that the master has erred in allowing the compl't's claim for profits subsequent to Nov.

15, 1884, or that the def't-, in the later statements of Frank A. Magowan and the evidence of Allen Magowan of April 9, '86, on account of the almost inappreciable extent of the infringement, as claimed by def't- and as shown by Exhibit Z attached to def'ts' statement of June 15, 1886, and Exhibit April 29, '84, are bound for only nominal damages for the second period, it will be an easy matter to strike out $3,473.77, the amount found for the second period, and substitute such nominal sum as will be proper.

All of which is respectfully submitted.

S. D. OLIPHANT,
Master, &c.

(Endorsed:) United States circuit court, district of New Jersey. In equity. The New York Belting and Packing Co. *vs.* Allen Magowan *et als.* Master's report. Filed August 1, 1887. S. D. Oliphant, clerk.

256 At a stated term of the circuit court of the United States of America for the third circuit and district of New Jersey, held at Trenton on the twenty-eighth day of September, 1887.

Present: The Honorable Joseph P. Bradley, judge.

THE NEW YORK BELTING AND PACKING COMPANY
vs.
ALLAN MAGOWAN, SPENCER M. ALPAUGH, and FRANK A. MAGOWAN. } In Equity.

This cause having been brought to a hearing upon the report of S. D. Oliphant, Esq., a master of this court, to whom it was referred to ascertain and take and state and report to the court an account of the gains, profits, and advantages which the defendants have received or which have arisen or accrued to them since January 26, 1869, from infringing the exclusive rights of the said complainant as owner of letters patent No. 86296, dated January 26th, 1869, granted to the complainant as assignee of Dennis C. Gately, for "improved vulcanized-rubber packing," by the manufacture, use, and sale of the improvements patented therein, and also what damages in additon thereto the complainant has sustained by reason of said infringements, which report, which was filed in the office of
257 the clerk of this court on the 1st day of August, 1887, finds that $9,026.66 gains and profits have been proven to have been received by or to have arisen or accrued to the defendants from the manufacture, use, or sale of the improvements patented in the letters patent No. 86296, and that the complainant has waived and abandoned any and all claims for damages that have been sustained by the said complainant from the said infringements in violation of the exclusive rights secured to the complainant by the letters patent aforesaid, the exceptions to said report filed by the defendants having been waived and withdrawn, on motion of Turner, Lee & McClure, complainant's solicitors, it is ordered, adjudged, and decreed that the master's report be, and the same hereby is, in all respects confirmed, and that the complainant recover of the defend-

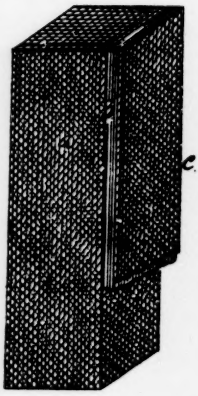
258a

D. C. Gately.

Vulcanized Rubber.

No. 86,296. Patented Jan. 26, 1869.

No. 305.
McGowan et al.
v.
Ny. B. & P. Co.
} p. 258a



Witnesses:
Wm. H. McCabe

Inventor:
Dennis C. Gately
by A. Pollok
his attorney.

ants the sum of nine thousand and twenty-six and $\frac{66}{100}$ dollars, the amount so reported due as aforesaid, together with the costs of this suit, taxed at seven hundred and forty-two dollars and five cents, making in the aggregate the total amount of nine thousand seven hundred and sixty-eight dollars and seventy-one cents, and that the complainant have execution therefor.

JOSEPH P. BRADLEY,
Circuit Justice.

(Endorsed:) U. S. circuit court, district of New Jersey. The New York Belting and Packing Company *vs.* Allan Magowan and others. Final decree. Turner, Lee & McClure, solicitors for complainant, 20 Nassau St., New York. Filed September 28, 1887. S. D. Oliphant, clerk.

258 UNITED STATES PATENT OFFICE.

DENNIS C. GATELY, of Newtown, Connecticut, assignor to New York Belting and Packing Company.

Letters Patent No. 86296, dated January 26, 1869.

Improved Vulcanized-Rubber Packing.

The schedule referred to in these letters patent and making part of the same.

To whom it may concern:

Be it known that I, Dennis C. Gately, of Newtown, in the county of Fairfield, and State of Connecticut, have invented certain new and useful improvements in vulcanized India-rubber packing; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, which represents a perspective view of a strip of packing made in accordance with my invention.

My invention relates to packing of the kind for which letters patent were issued to Charles McBurney on the 28th of June, 1859.

This packing, which is usually employed in the stuffing-boxes of pistons, is composed of plies of cloth or canvas, cut bias, coated with rubber, and pressed together and vulcanized.

When thus made, the packing is very solid, and possesses but little elastic property, so that as it wears there is some difficulty in maintaining a tight joint between it and the piston.

To obviate this disadvantage is the object of my invention, which consists in forming the packing with a backing of pure vulcanized rubber, or rubber of sufficient elasticity for the purpose desired, which may be covered and protected by a strip of canvas or other suitable fabric.

In the drawing—

(Here follows diagram marked p. 258*a*.)

a represents the ordinary packing-band, which is backed by the rubber strip *b*, the whole being vulcanized together, so as to be solidly united; and the rubber may be covered, if desired, by the canvas strip *c*, to protect it from injury.

When the packing is placed in the stuffing-box and around the piston, and the follower is screwed down, so as to compress the packing, the rubber strip will also be compressed, and forced against the sides of the stuffing-box, and as it cannot expand in the direction of the follower, it acts as a spring to hold the packing against the piston-rod, and to prevent leakage, compensating for any slight wear in the packing, and making a tight joint between the rod and the packing.

It would be manifestly impracticable to impart this quality of elasticity to the body of the packing, or that part which is in contact with or bears against the rod, but by backing it with an elastic cushion, which, upon being compressed between the follower and the sides of the stuffing-box, acts as above described, the packing is possessed of every qualification required for its successful use, and a tighter and better joint is made than has heretofore been practicable.

Having now described my invention, and the manner in which the same is or may be carried into effect,

What I claim, and desire to secure by letters patent, is—

The combination, with the packing, such as herein specified, of an elastic backing, or cushion of vulcanized India rubber, substantially as and for the purposes set forth.

In testimony whereof, I have signed my name to this specification, before two subscribing witnesses.

D. C. GATELY.

Witnesses:
HENRY BEERS GLOVER.
FLORENCE T. GLOVER.

258*b* (Indorsed:) U. S. circuit c't, dist. of N. J. N. Y. B. & P. Co. *vs.* Magowan. Compl't's Exhibit A.

259 COMPL'T'S EXHIBIT B. S. D. Oliphant, Examiner.

N. Y. BELTING & PACKING CO.
vs.
MAGOWAN.

STATE OF CONNECTICUT,
OFFICE OF SECRETARY OF STATE.

New York Belting and Packing Company.

The undersigned, president and directors of the New York Belting and Packing Company, hereby certify that the purposes for which said corporation is formed and established are the following, viz: To purchase, manufacture, and sell India-rubber fabrics of various

kinds, and particularly India-rubber belting, packing, and hose, and for that purpose to own the necessary manufactories, buildings, machinery, real estate, water power, stock, and other property.

The amount of the capital stock of said corporation is two hundred thousand dollars. The amount of capital actually paid in is two hundred thousand dollars, and the location of the business of the company and the place where said corporation intends to transact its business is at Newtown, county of Fairfield, State of Connecticut, and the names of the stockholders and the number of shares by each respectively owned are as follows:

William Judson, 4,995 shares.
John H. Cheever, 3,000 "
A. W. Thompson, 5 "

Newtown, May 13, 1856.

260 WILLIAM JUDSON, *President.*
JOHN H. CHEEVER,
WILLIAM JUDSON,
A. W. THOMPSON, *Directors.*

STATE OF NEW YORK,
City and County of New York, } ss:

JUNE 20, 1856.

Personally appeared William Judson, John H. Cheever, and A. W. Thompson, signers of the foregoing instrument, and severally acknowledged the same to be their free act and deed.

Before me—

FRED'K B. WIGHTMAN,
Commissioner, &c., for the State of Connecticut.

Received 14th June, 1856, and recorded by J. J. Dunock, cl'k, for N. D. Sperry, sec. of state.

261 STATE OF CONNECTICUT,
Office of Secretary of State, } ss:

I, D. Ward Northrop, secretary of the said State of Connecticut and keeper of the seal thereof and of the original record of the certificate of the organization of New York Belting and Packing Company, of which a copy is hereto annexed, do hereby certify that I have compared the annexed copy of the said certificate with the original record thereof now remaining in this office, and have found the said copy to be a correct transcript thereof and of the whole of the said original; and I further certify that the said original record is a public record of the said State of Connecticut and does not appertain to a court; that the original certificate was deposited in this office on the 14th day of June, 1856, and recorded in a book kept for that purpose.

In testimony whereof I have hereunto set my hand and
[SEAL.] affixed the seal of said State, at Hartford, this fourth day of November, 1884.

D. WARD NORTHROP,
Secretary of State.

262 STATE OF CONNECTICUT,
EXECUTIVE DEPARTMENT, HARTFORD, *Nov.* 12, 1884.

I, Thomas M. Waller, Governor of the State of Connecticut, hereby certify that D. Ward Northrop is now and hath been since the third day of January, A. D. 1883, secretary of said State and custodian of the great seal, and that to his official acts as such full faith and credit are and ought to be given.

Witness my hand, at the city of Hartford, this twelfth day of November, A. D. 1884.

THOMAS M. WALLER, *Governor.*

(Indorsed:) U. S. C. C., D. of N. J. New York B. & P. Co. *vs.* Magowan. Compl't's Exh. B.

263 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specification and drawing in the matter of the English letters patent granted Joseph Henry Tuck August 25, 1854, number 1865, for "improvements in packing for pistons, piston rods, valves, and other uses."

In testimony whereof I, R. G. Dyrenforth, acting Commissioner of Patents, have caused the seal of the Patent Office to be [L. S.] affixed this 30th day of October, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

R. G. DYRENFORTH,
Acting Commissioner.

264 A. D. 1854. No. 1865.

Packing for Pistons, Valves, &c.

Letters patent to Joseph Henry Tuck, of Pall Mall, in the county of Middlesex, engineer, for the invention of "improvements in packing for pistons, piston rods, valves, and other uses."

Sealed the 31st October, 1854, and dated the 25th August, 1854.

Specification in pursuance of the conditions of the letters patent filed by the said Joseph Henry Tuck in the Great Seal Patent Office on the 23rd February, 1855.

To all to whom these presents shall come I, Joseph Henry Tuck, of Pall Mall, in the county of Middlesex, engineer, send greeting:

Whereas her most excellent majesty Queen Victoria, by her letters patent bearing date the twenty-fifth day of August, in the year of our Lord one thousand eight hundred and fifty-four, in the eighteenth year of her reign, did, for herself, her heirs and successsors, give and grant unto me, the said Joseph Henry Tuck, her special license that I, the said Joseph Henry Tuck, my executors, admin-

istrators, and assigns, or such others as I, the said Joseph Henry Tuck, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times
265 thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an invention for "improvements in packing for pistons, piston rods, valves, and other uses," upon the condition (amongst others) that I, the said Joseph Henry Tuck, by an instrument in writing, under my hand and seal, should particularly describe and ascertain the nature of the said invention and in what manner the same was to be performed and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

Now, know ye that I, the said Joseph Henry Tuck, do hereby declare the nature of my said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement, reference being had to the drawing hereunto annexed and to the letters and figures marked thereon (that is to say):

My invention of "improvements in packing for pistons, piston rods, valves, and other uses" is intended to combine a flexible material with an elastic material in such manner as to cause the former to be constantly kept in contact with the rubbing or bearing surface by the elasticity of the former, and this object is accomplished by constructing the packing with a block or core of India rubber or other suitable elastic material, surrounded or covered by folds of flexible material or fabric, the India-rubber block or core being so placed or arranged and of such form and size as to be calculated by its elasticity to keep the fabric close against the rubbing or bearing surface during the wear of such fabric. In some cases it
266 might be sufficient to place the India rubber in combination with the flexible material, without the former being covered by the latter.

I prefer that the flexible material should be that of canvas coated or saturated with a solution of India rubber or other suitable composition; but this material may be varied. I also prefer in some cases that the block or core of India rubber inclosed therein should be placed or arranged within the roll of packing in a position further removed from the rubbing or bearing surface than the centre of such roll; also that the said block or core should be formed oblong or oval, but it may be of any convenient form and either solid or tubular, and may be placed in the centre of the roll.

In order to manufacture a roll of packing with the block or core out of the centre a portion of the flexible material or fabric is folded into a roll of about the greatest diameter or thickness of the block or core, and the two bodies thus formed are folded in the remainder of the flexible material or fabric required to form the roll of packing; and in order to manufacture a roll of packing with the block or core in the centre the flexible material or fabric may be simply folded upon the block or core.

The above materials, combined as described, may either be employed as constituting a packing by themselves or they may be used for the purpose in combination with other suitable materials.

In order, however, that my invention may be fully understood, I will proceed to describe several modes of carrying it into effect, represented in the accompanying drawing.

(Here follows diagram marked p. 266*a*.)

267 Fig. 1 is a section of a roll of packing composed of a square block or core of India rubber, A, around which is folded the flexible material or fabrics B, thereby forming a packing square or nearly square in the cross-section. Fig. 2 represents a block or core, A, with rounded corners, within folds of flexible material or fabric B, thereby forming a circular packing. Fig. 3 is a similar representation of an oval packing. In these cases the elastic block or core is in the centre of the roll, the flexible material or fabric being merely wrapped or folded around the elastic core. Fig. 4 is a section of a roll of packing in which the elastic block or core A is out of the centre. This packing is formed by first rolling a piece of flexible material into a roll, C, of about the depth or greatest thickness of the elastic block A, and then wrapping or folding A and C in the flexible material or fabric B, thereby forming a square packing, the side D of which is intended to be kept in contact with the rubbing surface. Fig. 5 represents a packing constructed in a similar manner, but of a different form in the cross-section. Fig. 6 is a section of a roll of packing with a central elastic core, A, of a tubular form, the flexible material or fabric B being wrapped around it, as in Figs. 1 and 2. Fig. 7 represents a roll of packing composed of a tubular elastic core, A, and a roll of elastic material, C, enclosed within folds of elastic material B in such a manner as to place the elastic core A out of the centre and bring the roll C between it and the rubbing surface at D. Fig. 8 is a similar representation of a packing with a semi-tubular elastic core, A. Fig. 9 represents a solid elastic core, A, with a roll of elastic material, B, between it and the rubbing surface at D.

268 It will be evident from these examples that the mode of combining the elastic block or core with the flexible material or fabric may be varied. I would also remark that I have not thought it necessary to explain any mode or modes of applying the packing, as these are well-known, and my invention does not relate to them; neither have I described any mode of combining packing composed as described with other material, as my invention does not relate to any particular combination thereof, but has reference solely to the mode of composing the roll, which may be applied in different ways, and be used either by itself or in combination with other material, as preferred.

Having thus described the nature of my invention and in what manner the same is to be performed, I would have it understood that I do not mean or intend to confine myself to the precise forms and modes of combination of the parts represented and described;

266a

A.D. 1854 Aug 25 No 1865.
TUCKS SPECIFICATION.

(1 SHEET)

FIG. 1

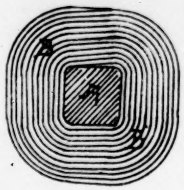


FIG. 2.



FIG. 3



FIG. 4.

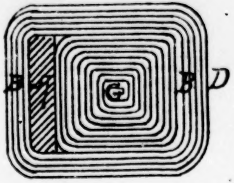


FIG. 5.



FIG. 6.



FIG. 7

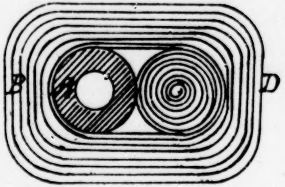
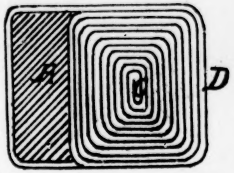


FIG. 8.



FIG. 9.



No. 305.
Magowan et al
v.
Ny. B. & P. Co.
} p 266a

neither do I claim as of my invention any of the parts separately, or otherwise than as used in combination for the purposes described; but what I do claim as of my invention is the construction of a roll of packing composed of an elastic block or core combined with a flexible material or fabric, as described.

In witness whereof I, the said Joseph Henry Tuck, have hereunto set my hand and seal this *sixty*-day of November, in the year of our Lord one thousand eight hundred and fifty-four.

J. H. TUCK. [L. S.]

Witness:

WILLIAM SPENCE,
50 Chancery Lane.

Ex'd: C. F.; E. L. L.

269 (Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *vs.* Magowan & *als.* Defendants' Exhibit "Tuck's English Patent, 1854." Lewis W. Scott, examiner

270 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the letters patent granted Joseph Henry Tuck June 26, 1855, number 13145, for improvements in packing for stuffing boxes, &c.

In testimony whereof I, Benj. Butterworth, Commissioner of Patents, have caused the seal of the Patent Office to be [SEAL.] affixed this 29th day of December, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

BENJ. BUTTERWORTH,
Commissioner.

271 No. 13145.

UNITED STATES OF AMERICA:

To all to whom these letters patent shall come:

Whereas Joseph Henry Tuck, of Pall Mall, England, has alleged that he has invented new and useful improvements in packing for stuffing boxes, &c., which he states have not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvements, and that the same have not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States a sum of thirty dollars and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in

the said improvements, and praying that a patent may be granted for that purpose:

These are, therefore, to grant, according to law, to the said Joseph Henry Tuck, his heirs, administrators, or assigns, for the term of fourteen years from the twenty-sixth day of June, one thousand eight hundred and fifty-five, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used the said improvements, a description whereof is given in the words of the said Tuck in the schedule hereunto annexed and is made a part of these presents.

In testimony whereof I have caused these letters to be made patent and the seal of the Patent Office has been hereunto affixed.

272 Given under my hand, at the city of Washington, this twenty-sixth day of June, in the year of our Lord one [SEAL.] thousand eight hundred and fifty-five, and of the Independence of the United States of America the seventy-ninth.

ROBERT McCLELLAND,
Secretary of Interior.

Countersigned and sealed with the seal of the Patent Office.
C. MASON.

273 Specifications forming part of the Letters Patent No. 13145, dated June 26, 1855.

To all whom it may concern:

Be it known that I, Joseph Henry Tuck, a citizen of the United States, but now residing at Pall Mall, in the county of Middlesex, England, have invented or produced a new and useful article of manufacture for packing the pistons, cylinders, or valves of steam-engines, or for other similar purposes; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which represent in sections modified forms of the manner in which the article is prepared.

My invention relates to an improved manner or mode of making or forming packing for pistons, valves, & other parts of steam-engines, and for like purposes, from India rubber and canvas saturated with India rubber, or other suitable material or composition.

To enable others skilled in the art to make and use my invention I will proceed to describe the same with reference to the drawings:

(Here follows diagram marked p. 273*a*.)

I first take canvas or other suitable material and saturate it with a solution of India rubber or other equivalent composition. I then cut the canvas thus prepared in a diagonal manner into strips of any required width, cement the diagonal ends together so as to form any length of fillet required, then roll it up into a roll and allow it to cement in a firm but elastic or flexible roll of any suitable diameter required. In cases where greater elasticity is required I roll the

J. H. Tuck,

Steam-Engine Packing.

No. 13,145. Patented June 26, 1855.

No 305. Mapowanetab. Ny Tuck P. Co } p. 273 a

Fig 5.



Fig 4.



Fig 3.

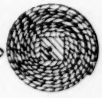


Fig 2.



Fig 1.

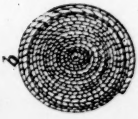
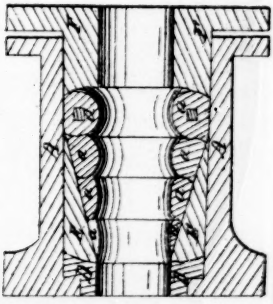


Fig 6





canvas round a core or center-piece of India rubber or other suitable elastic material.

274 Fig. 1 represents a section of the packing which is rolled up from its own center, and may be round or nearly so.

Fig. 2 represents another form of rolling up the saturated canvas, where it is drawn down or rolled loosely at one point and tight at the opposite point. By this manner of rolling, the packing may have a conical form, so as to be used in conical seats, and for giving it the exact conical form required it may be run through suitably shaped rolls to compress it into the shape of the rolls or the grooves therein.

Fig. 3 represents the canvas rolled around an elastic center or core of rubber, *a* representing the core, and *b* the canvas. This core may be square, round, oblong, oval, or of any desired form which the roll of packing is designed to possess.

Fig. 4 represents a hollow or cylindrical core, or it may be a section of a cylinder of prepared rubber or other similar material, around which the canvas is rolled; and

Fig. 5 represents the combined forms shown in Figs. 1 and 4, where the canvas is first rolled from its own center, and is then rolled around the core so as to embrace both its own coils and the core in its outer folds. In all these figures but a modification of one general plan is illustrated, viz., the rolling of canvas, first saturated as described, into a fillet in any reasonable lengths and of any diameter, from which packing may be cut in lengths as required. A packing such as herein described has heretofore not been known as an article of commerce or of manufacture, and as such I claim to be the first inventor or producer of it.

Fig. 6 represents a vertical section through a packing box showing the manner of applying the packing, in which A represents

275 the packing box and B the piston rod. D is a ring in the lower end of the packing box, against — a divided cylindrical block E, with a conical opening through it, rests. *a a a a* represents the rings of packing, which are forced down by the head F, and in being forced down as the packing wears the conical form of the opening in E keeps it tight up against the piston rod. Any of the forms of packing represented in the several figures 1, 2, 3, 4, 5 may be used, that represented at Fig. 2 being more peculiarly adapted to the lower part of the packing box on account of the conical form of the block E behind it.

Piston heads and valves or other places may be packed in a similar manner, the packing being cut off in lengths to suit the thing to be packed. By this mode of manufacture it will be seen that each fold of the packing in contact with the rubbing or moving surface must be entirely worn away and cannot be drawn out by the rubbing surface (as is frequently the case when packing is made in concentric folds of prepared canvas), being held in its place by the ring above and below it.

Having thus fully described the nature of my invention and its application, what I claim therein as new, and desire to secure by letters patent, is—

The forming of packing for pistons or stuffing boxes of steam-engines and for like purposes out of saturated canvas so cut as that the thread or warp shall run in a diagonal direction from the line or centre of the roll of packing and rolled into form either in connection with the India-rubber core or other elastic material or without, as herein set forth.

J. H. TUCK.

Witnesses:
A. B. STOUGHTON.
THOS. H. UPPERMAN.

Ex'd: E. A. M.; H. M. H.

276 (Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *vs.* Magowan & *als.* Defendants' Exhibit "Tuck's U. S. Patent, 1855," Lewis W. Scott, examiner.

277 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specification and drawing in the matter of the English letters patent granted Joseph Henry Tuck October 14, 1852, number 384, for improvements in stuffing boxes and in packing to be used in stuffing boxes, bearings, pistons, and valves.

In testimony whereof I, R. G. Dyrenforth, acting Commissioner of Patents, have caused the seal of the Patent Office to be affixed [L. S.] this 30th day of October, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

R. G. DYRENFORTH,
Acting Commissioner.

278 A. D. 1852. No. 384.

Stuffing Boxes and Packing to be Used in Stuffing Boxes, Bearings, Pistons, and Valves.

Letters patent to Joseph Henry Tuck, of Pall Mall, in the county of Middlesex, engineer, for the invention of "improvements in stuffing boxes and in packing to be used in stuffing boxes, bearings, pistons, and valves."

Sealed the 27th January, 1853, and dated the 14th October, 1852.

Specification in pursuance of the condition of the letters patent filed by the said Joseph Henry Tuck in the Great Seal Patent Office on the 14th April 1853.

To all to whom these presents shall come I, Joseph Henry Tuck, of Pall Mall, in the county of Middlesex, engineer, send greeting:

Whereas her most excellent majesty Queen Victoria, by her let-

ters patent bearing date the fourteenth day of October, in the year of our Lord one thousand eight hundred and fifty-two, in the sixteenth year of her reign, did, for herself, her heirs and successors, give and grant unto me, the said Joseph Henry Tuck, her special license that I, the said Joseph Henry Tuck, my executors, administrators, and assigns, or such others as I, the said Joseph Henry Tuck, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and the Isle of Man, an invention for "improvements in stuffing boxes and packing to be
279 used in stuffing boxes, bearings, pistons, and valves," upon the condition (amongst others) that I, the said Joseph Henry Tuck, by an instrument in writing, under my hand and seal, should particularly describe and ascertain the nature of the said invention and in what manner the same was to be performed and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

Now, know ye that I, the said Joseph Henry Tuck, do hereby declare the nature of my said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement, reference being had to the drawings hereunto annexed, and to the letters and figures marked thereon (that is to say):

The object of this invention is to make an enduring packing for piston rods, pistons, valves, stuffing boxes, bearings, and other rubbing surfaces. Instead of using hemp or metal packing, as heretofore, I construct a packing composed partly of yielding and partly of rigid substances. The elastic part of the packing is, by preference, composed of rolls or folds of canvas, coated with India rubber, and in the tubes or ribs of this stuffing I sometimes insert strands or blocks of India rubber. The hard substances which I use in conjunction therewith are segmental or other suitably shaped pieces of wood or metal, which are intended to lie or work in contact with the metallic surface, whether moving or stationary (as the case may be), against which the packing is intended to bear, the segmental or other shaped pieces being kept up to the rubbing surface by the elastic pressure of the yielding substance. In order the better to ensure the proper action of this substance in glands or stuff-
280 ing boxes I give the interior of the gland a conical form, or I insert in the stuffing box a conical filling piece, which will answer the same purpose. By this means the pressure downwards of the gland or cover of the box will ensure the proper binding of the packing around the piston rod. I sometimes also turn a half-round annular groove in the gland or stuffing box to act as a second oil cup and thereby prevent the waste of the oil. The segmental pieces may be put together so as to prevent a continuous hard surface to the piston rod in the form of a tube, the pieces being put together as rings, forming break joints and locking the one ring into

the other to prevent the independent movement of any piece, or between the rings the elastic material may be interposed, so as to present a varied packing surface of alternate rings of flexible or elastic combined with rigid or unyielding materials.

In order, however, that my invention may be more clearly understood I have in the accompanying drawings shown various plans for carrying my improvements into effect.

(Here follow diagrams marked pp. 280*a*, 280*b*, & 280*c*.)

Fig. 1, sheet 1, is a vertical section of a stuffing box, with its packing constructed and arranged upon the improved plan. *a* is the stuffing box. *b* is the gland; *c*, the bottom bush of the ordinary stuffing box. *d* is a lining constructed in the form of a frustrum of a cone and formed, by preference, of wood or other rigid material which is a bad conductor of heat. This lining is divided into two or more places, so as to consist of any number of parts, which when assembled together form the frustrum of a cone, as shewn in the figure. *e* is my improved elastic packing, or other ordinary packing may be used, if prefered. *f* is the piston rod or rubbing surface against which the packing is forced by screwing down the gland *b*. It will be readily seen that a slight pressure on the gland *b* will force the soft or elastic packing down and compress it inside the cone *d*, which, being of an inclined or wedged form, thereby forces the
281 packing *e* directly against the rod *f* and keeps it steam-tight. Fig. 2 is a vertical section, showing a modification of the above. The parts *a*, *b*, *c*, *d*, *e*, and *f* are the same as in Fig. 1. *g g* are rings of metal or other suitable material cut in two or more parts and placed between the rings or layers of soft packing, thus presenting a compound surface to the rod *f* or other sliding part. Fig. 3 represents a modification of Fig. 2. In this instance, however, the cone or lining *d* is dispensed with. Fig. 4 is a modification in which the lining *d* is used in conjunction with the parts shown in Fig. 3. In these figures, 3 and 4, the hard rings consist of four parts, or two rings of triangular section placed together base to base, thereby forming one ring. In Fig. 5 a series of rings, each consisting of two or more parts, are shewn as placed one upon the other, so that a solid surface is presented to the rod or portion liable to friction. Behind these rings, which form a cylinder or cone, as the case may be, according to the shape of the backs of the rings, soft packing is applied, which, when pressed down, forces the hard rings *g g* against the piston rod or other movable rubbing surfaces. Fig. 6 is a modification of Fig. 5, with the addition of the conical lining *d*. In Fig. 7 the gland *b* is made conical on the inside, so that by screwing down the gland the cone attached thereto is made to force the soft or elastic packing *e* up against the rod *f* or movable rubbing surface in the same manner as in Fig. 1. In Fig. 8 a double series of rings, each of two or more parts, which are of a triangular section, are placed upon each other. The rings *h h* are forced back against the inside of the stuffing, and the rings *g g* are forced against the rod or

moving surface by being pressed from above. *j j* are rings of
282 soft packing to fill up the space at the back of the rings *g g*.

Fig. 9 is a vertical section and Fig. 10 a plan view of another improvement in stuffing boxes, the object of which is to enable the lining or stuffing to be removed from the box with greater facility and in a more convenient manner than is usually the case. The stuffing box is lined with a metallic cup or box, *k k*, which is so made and adapted to the stuffing box that it may be drawn out of the box, bringing with it the whole of the packing which is placed in the cup box or lining *k k*. This cup or lining is made of two or more parts, and the upper flange thereof rests upon the flange of the stuffing box *a*. The packing is shown in the drawing as being made upon the principle already described and consists of a cone, *d*, made of wood or other bad conductor of heat, combined with soft elastic packing *e*, which is or may be compressed against the rod *f* by screwing down the gland *b*. The cup or lining *k* and packing contained therein may be drawn up out of the stuffing box by means of the screws *l l*, the shoulders of which bear upon the plate *m*, which lies on the flange of the stuffing box *a*, and, therefore, by turning these screws, the cup or lining *k*, with the packing contained therein, will be lifted out of the stuffing box to any desired height. A jam-nut, *n*, is provided for securing the screws at any point where the cup or lining *k* has been raised high enough. As the cup or lining *k* is constructed in two or more sections, it will be evident that when it has been raised out of the stuffing box its parts may be separated and removed, thus leaving the packing exposed and entire upon the rod or trunnion, so that it may be adjusted, repaired, or removed, as may be required.

I would here observe that any of the plans above shown and described for making a packing or lining for stuffing boxes may be
283 adapted to and employed in connection with the improvement just described and shown in figures 9 and 10, or any ordinary packing may be used, the object of this improvement merely being to enable the packing to be lifted or drawn out of the stuffing box with facility when it is required to be repaired, adjusted, examined, or removed. In figures 11, 12, 13, 14, and 15 I have shewn several methods of adapting my improved system of compound packing to D slide valves. Fig. 11 represents a plan or top or end view of the packing suitable for a D slide valve with my improvements adapted thereto. Fig. 11^a is a view of the packing as seen from the inside, and Fig. 11^b is a cross-section of the same taken in the line 1 2 of figures 11 and 11^a. The slide or moving surface is shewn at *c*. The hard packing *p* is kept against the slide or moving surface by the soft or elastic packing *q* at back, which is pressed forward by the metal jacket *r*. The hard packing consists of an entire metal surface presented to the slide, and formed of a series of flat-linked or mortice-jointed chains lying close against each other and riveted throughout and kept up to its proper position against the slide by the soft packing and jacket *r* at the back and ends.

Fig. 12 is an end view of another mode of making packing for D slide valves. In place of the metal chains *p*, shewn in Fig. 11, the hard

surface is composed of metallic plates or bands the edges of which are turned up so as to form a kind of trough or groove, as shewn in the inside view, Fig. 12ª, and the edge or sectional view, Fig. 12ᵇ. Behind these metal plates or bands *p* is placed the soft packing *q*, which is pressed forward, as in the other instance, by the jacket *r*. Fig. 13 is a sectional view and Fig. 12ª a cross of another modification, in which the metal-rubbing surfaces *p* of the other plans is dis-
284 pensed with and soft or elastic packing is employed in place thereof. *s* and *t* are sheets or bands of canvas, which are shewn together, but have between them strips of caoutchouc or other elastic material *u u* for the purpose of giving elasticity to the packing, which is pressed against the slide by means of the jacket *r* at back, as in the former instances. Fig. 14 is another modification in which the hard and soft surfaces are combined. The hard or metal surface is composed of segments of rings *p*, the section of which is of a wedge form, as will be seen by referring to the cross-section, Fig. 14ᵇ. Between these segments is placed the soft packing *q*, which is pressed up against the hard packing by the jacket *r*, as before. Fig. 15 is a modification in which the hard or metal surface is also composed of segments of rings *p*, but the soft packing, instead of being inserted between these segments, as in Fig. 14, is placed behind them and is pressed forward by the jacket *r*.

This improved system of compound packing, composed of rigid and solid materials, is also applicable to packing the rubbing surfaces of rotary engines, as will be seen in Fig. 16, which represents a longitudinal section of a rotary engine with my improvements adapted thereto. *a a* are the cylinder heads or ends; *b b*, the piston; *c c*, the jacket. *d d* is a serrated piece of metal or wood let into a groove or recess made in each end of the piston. *e* is another serrated piece of the same form and material, and is also inserted in the same groove, but allowed to be forced outward towards the cylinder head by the double serrated piece *f*, which is acted upon by the inclined planes *g g*, which are moved by the right and left handed screw rod *h*. This screw rod *h* may be turned by means of a socket spanner or any other convenient contrivance or instrument which can be inserted in the opening filled by the plug *i*. *k k* is a
285 soft packing inserted between the back of the serrated piece *e* and the metal plate *l*, which is divided into triangular pieces.

It will be easily perceived that in order to tighten the packing in the ends of the piston it will not be necessary to remove the cylinder heads, as is usually the case, but simply to take out the plug *i* and insert a socket-spanner or other tool to fit the end of the screw rod *h*, by turning which the two inclined pieces or wedges will be drawn towards each other, thereby tending to force upward the double serrated piece *f f*, which piece, by acting against the parts *d* and *e*, causes the piece *e* to move outward towards the cylinder head and carry with it the soft packing *k k*, which will force the triangular pieces *l l* against the cylinder head. The ends *m m* of the jacket *c* are turned to a sharp bevel towards the inner surface of the end plate *a*. A conical metal ring, *n n*, composed of one or more parts,

is fitted thereto, and the space behind is filled with soft packing, *o o*, which may, by the screws *p p*, be forced up against the rings *n n*, thereby pressing them against the cylinder head *a a*. The ends of the screws *p p* bear against the rings *r r*, and thereby force forward the soft packing *o o* and other parts contiguous thereto.

Having now described my invention and the best means with which I am at present acquainted for carrying the same into effect, I would observe, in conclusion, that I do not intend to confine myself rigidly to the precise arrangement or construction of parts herein shewn, as they may perhaps be varried without departing from the nature and object of my invention; but that which I consider to be new in the above improvements, and therefore wish to claim
286 as the invention secured to me by letters patent, is the methods herein shewn and described or any mere modification thereof of combining hard and soft substances together for the purpose of making steam-tight elastic packing. I claim particularly the use of the conical cup *d* behind the elastic packing, whereby the soft packing is prevented from being overheated. I also claim the method above shewn and described of packing the pistons and other parts of rotary engines or any modification thereof, whereby the packing may be tightened with facility without removing the cylinder head or end or any portion thereof.

Second: I claim adapting to the interior of stuffing boxes a cup or lining in which is placed the elastic or other packing, so that the said cup or lining containing the packing may be drawn up out of the stuffing box when required.

In witness whereof I, the said Joseph Henry Tuck, have hereunto set my hand and seal this fourteenth day of April, one thousand eight hundred and fifty-three.

J. H. TUCK. [L. S.]

Witness:
FRED. WALKDEN, 66 Chancery Lane.

Ex'd: M. McK.; J. A. W.

(Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *vs.* Allan Magowan & *als.* Defendants' Exhibit "Tuck's English Patent, 1852," Lewis W. Scott, examiner.

[Endorsed:] Tuck's 1852 patent, 22142, D, '84.

287 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specification and drawing "in the matter of the English letters patent granted Edward Keirby January 4, 1865, number 19, for improvements in the manufacture of elastic packings for pistons and in lubricating compositions therefor."

In testimony whereof I, R. G. Dyrenforth, acting Commissioner

of Patents, have caused the seal of the Patent Office to be
[SEAL.] affixed this 30th day of October, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

R. G. DYRENFORTH,
Acting Commissioner.

288 A. D. 1865, 4th January. No. 19.

Packing and Lubricating for Pistons.

Letters patent to Edward Keirby, of Rochdale, in the county of Lancaster, India-rubber manufacturer, for the invention of "improvements in the manufacture of elastic packings for pistons and in lubricating compositions therefor."

Sealed the 17th March, 1865, and dated the 4th January, 1865.

Specification in pursuance of the conditions of the letters patent filed by the said Edward Keirby in the Great Seal Patent Office on the 29th June, 1865.

To all to whom these presents shall come I, Edward Keirby, of Rochdale, in the county of Lancaster, India-rubber manufacturer, send greeting:

Whereas her most excellent majesty Queen Victoria, by her letters patent bearing date the fourth day of January, in the year of our Lord one thousand eight hundred and sixty-five, in the twenty-eighth year of her reign, did, for herself, her heirs and successors, give and grant unto me, the said Edward Keirby, her special license that I, the said Edward Keirby, my executors, administrators, and assigns, or such others as I, the said Edward Keirby, my executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, ex-
289 ercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an invention for "improvements in the manufacture of elastic packings for pistons and in lubricating compositions therefor," upon the condition (amongst others) that I, the said Edward Keirby, my executors or administrators, by an instrument in writing, under my or their or one of their hands and seals, should particularly describe and ascertain the nature of the said invention and in what manner the same was to be performed and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

Now, know ye that I, the said Edward Keirby, do hereby declare the nature of my said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement (that is to say):

My invention consists in manufacturing elastic packings for the pistons and piston rods of steam engines or pumps in the form of a

A.D. 1865. JAN. 4 N° 19.
KEIRBY'S SPECIFICATION.

(1 SHEET)

No. 305.
Magowan et al.
Ny. B & P. Co.
} p. 289a

FIG. 1.

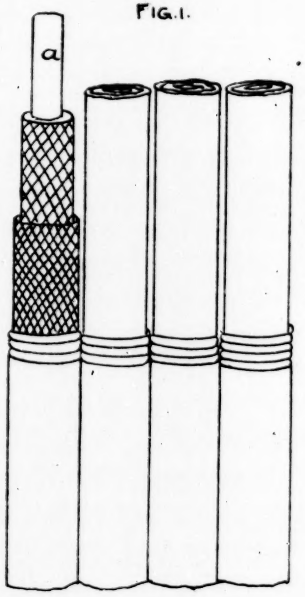


FIG. 2.



FIG. 3.



FIG. 4.

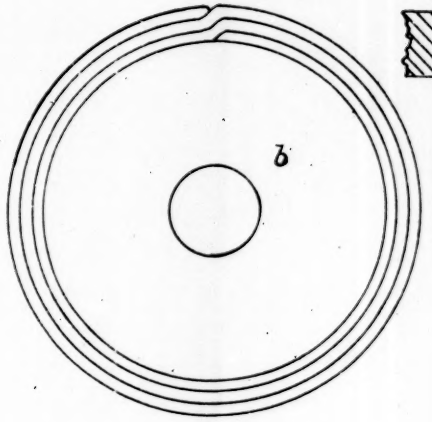
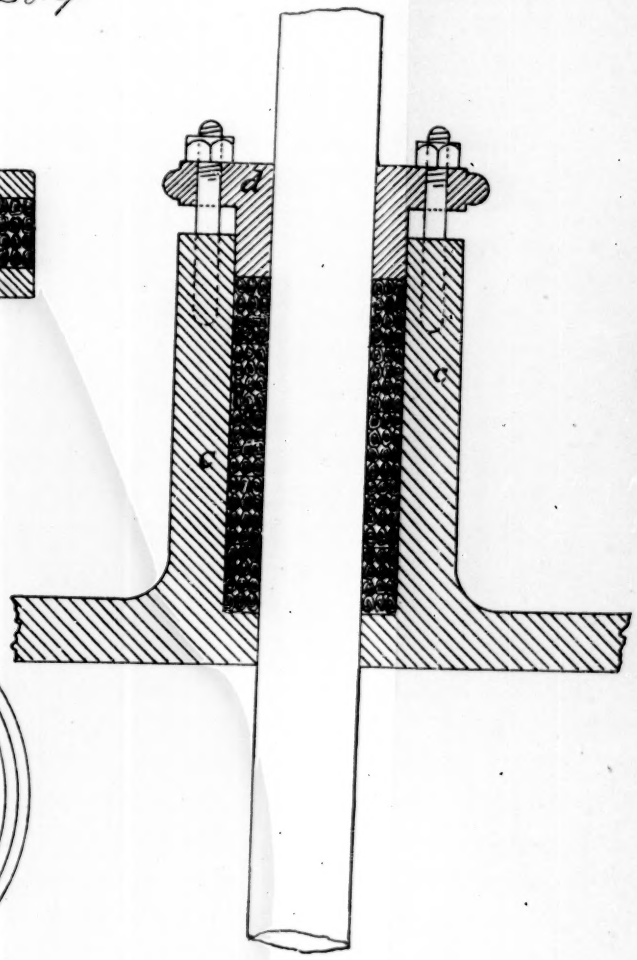


FIG. 5.



flat rope or web composed of two or more strands or plaits of hemp or other fibrous substances united together in a loom or other suitable machine by a binding weft, as shewn at figures 1 and 2 of the accompanying sheet of drawings.

(Here follows diagram marked p. 289*a*.)

In this instance I have shewn a web composed of four plaited strands, but a greater or less number of strands may be employed. Each plait or strand is formed by plaiting together any convenient number of yarns of flax, hemp, or other suitable fibrous material in a braiding machine of the ordinary construction, and each plait or strand contains by preference an elastic core of vulcanized India rubber or other suitable elastic material, marked *a a*. This
290 partially formed strand is then covered with yarns of flax or other fibres in another braiding machine and then saturated in the improved lubricating composition hereinafter described or in any other suitable lubricating compound. The strands thus prepared are united by a binding weft in a loom of suitable construction. The flat rope or web thus prepared is then passed between a pair of smoothing rollers to make it flat and even, and then again passed through the lubricating compound. When cool the packing is ready for use. The width of the packing must be about equal to the width of the groove in the piston to be packed as shewn in figures 3 and 4, which represent a small piston, marked *b*, with a single coil of the improved packing. The thickness of the packing is considerably less than the depth of the groove, so that the packing must be wound two or more times (I prefer three times) round the piston to fill up the groove, thus avoiding the jump joint heretofore unavoidable in hemp packings. If the coil of packing should be found too thick to enter the cylinder the packing must be unwound from the piston and gently hammered on a smooth, hard surface to flatten it. This operation must be repeated until the packing is sufficiently reduced in thickness to allow the piston to enter the cylinder. In large pistons and in pump buckets two or more coils of packing may be required to fill up the groove. Figure 5 represents a section of a stuffing box for a piston rod with my improved elastic packing. The coils of packing are successively placed in the stuffing box *c* either by hand or by the aid of a flat-ended piece of wood if the box is too deep for the operator to reach to the bottom by hand. The lid *d* is then screwed down gently. When the engine is at
291 work the steam penetrates the elastic packing and by entering the core causes the packing to expand, thus forming a perfectly steam-tight fit; or the strands or plaits with an elastic core, as above described, may be used singly or combined by plaiting together instead of weaving together, as above described.

Another part of my invention consists in combining with the tallow and oil or other ingredients employed to lubricate the packings of pistons a certain proportion of soda ash to allow the steam to penetrate the packing and thus to prevent it being burnt. In manufacturing my improved lubricating compositions I have found

the following ingredients combined in the proportions given to produce the desired results, but I do not limit myself to the details: One part by weight of soda ash, three parts of oil or tallow, one part of lead ore, and two parts of soap. In order to mix these ingredients together I make use of an iron pan or vessel, in which a small quantity of water is placed, sufficient to cover the bottom. The pan is then placed over the fire and heated. The soda ash and soap are then put in the pan and mixed together until both are dissolved. I then add the oil or tallow and the lead ore, and the heat is increased until the whole is thoroughly dissolved. The mixture must be agitated occasionally to assist the operation. The strands and web are passed slowly through the hot composition in order that every part thereof may be well saturated.

Having thus stated the nature of my invention and described the manner of performing the same, I declare that I claim—

First. The improved manufacture of elastic packing and the mode of fitting the packing to the piston or stuffing box to avoid jump joints, as shewn and described; and,

Secondly. The improved lubricating composition manu-
292 factured in the manner described, and particularly the application of soda ash to render the packing pervious to the steam.

In witness whereof I, the said Edward Keirby, have hereto set my hand and seal this twenty-seventh day of June, one thousand eight hundred and sixty-five.

EDWARD KEIRBY. [L. S.]

Ex'd: E. L. L.; C. F.

(Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *vs.* Magowan & *als.* Defendants' Exhibit "Keirby Patent, 1865," Lewis W. Scott, examiner.

293 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the specification and drawing in the matter of the English letters patent granted John Edwin Keirby August 11, 1866, number 2064, for "improvements in packing for steam, water, air, and gas tight joints."

In testimony whereof I, R. G. Dyrenforth, acting Commissioner of Patents, have caused the seal of the Patent Office to be
[L. S.] affixed this 30th day of October, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

R. G. DYRENFORTH,
Acting Commissioner.

294 A. D. 1866, 11th August. No. 2064.

Packing.

Letters patent to John Edwin Keirby, of Parker-street Mill, Manchester, in the county of Lancaster, India-rubber merchant, for the invention of "improvements in packing for steam, water, air, and gas tight joints."

Sealed the 5th February, 1867, and dated the 11th August, 1866.

Specification in pursuance of the conditions of the letters patent filed by the said John Edwin Keirby in the Great Seal Patent Office on the 11th February, 1867.

To all to whom these presents shall come I, John Edwin Keirby, of Parker-street Mill, Manchester, in the county of Lancaster, India-rubber merchant, send greeting:

Whereas her most excellent majesty Queen Victoria, by her letters patent bearing date the eleventh day of August, in the year of our Lord one thousand eight hundred and sixty-six, in the thirteenth year of her reign, did, for herself, her heirs and successors, give and grant unto me, the said John Edwin Keirby, her special license that I, the said John Edwin Keirby, my executors, administrators, and assigns, or such others as I, the said John Edwin Keirby, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an invention for "improvements in packing for steam, water, air, and gas tight joints," upon the condition (amongst others) that I, the said John Edwin Keirby, by an instrument in writing, under my hand and seal, should particularly describe and ascertain the nature of said invention and in what manner the same was to be performed and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said letters patent:

295

Now, know ye that I, the said John Edwin Keirby, do hereby declare the nature of my said invention and in what manner the same is to be performed to be particularly described and ascertained in and by the following statement, reference being had to the accompanying drawings and to the letters and figures marked thereon—that is to say:

My said invention relates to that description of packing usually termed rope packing, and which is made by covering wire with hemp or other fibrous material saturated with red lead, and my said invention consists in combining India rubber or other flexible substance with the said wire and fibrous material.

I propose in carrying out my invention to braid or wind strips of India rubber upon the wire and then to apply the hemp or other such material and red lead.

In using it for forming steam, water, air, gas, or other joints it is applied similarly to other packing now in use.

And in order that my said invention may be properly understood I now proceed more particularly to set forth the system, mode, or manner under which the same is or may be used or carried into effect, reference being had for the sake of more complete elucidation to the several figures upon the explanatory sheet of drawings which I have hereunto appended—that is to say:

(Here follows diagram marked p. 295*a*.)

296 Figure 1 is a longitudinal section of the rope packing constructed in accordance with my invention. Figure 2 is a corresponding longitudinal elevation of the same, and figure 3 a transverse section.

On referring to these figures it will be clearly seen that the central part of the rope packing consists of a metallic wire, marked *a a*, which is surrounded by or embedded in a layer or coating of India rubber, *b b*, around which is knitted the hemp or other fibrous material, marked *c c*. The wire in the centre may be of any suitable metal, and the India rubber may be put on in various ways, as may under any circumstances be found most convenient, for I do not lay any claim to the mode of manufacturing the said rope packing, and this will to a great extent depend upon the state in which the India rubber or other elastic substance is obtained. If the rubber or other elastic material is obtained in long filaments or strands it may be braided over the wire by an ordinary braiding machine or otherwise. If it is obtained in strips or ribands it may be twisted thereon or laid parallel thereto, and becomes fixed in position and drawn tight around the wire by the compressing action upon it of the outside covering of hemp or other fibrous material. The hemp or other fibrous material previous to being placed over the cover of India rubber and wire is saturated with red lead, and when so saturated is knitted over the core by an ordinary knitting machine.

A very efficient form under which packing of the kind hereinbefore described may be used is shown at figures 4 and 5. It consists of a piece of the packing constructed similarly to that herein previously specified, which is turned round two or three times in such manner as to form a ring, as shown in plan in figure 4. This ring is wound or bound over with hemp or other suitable fibrous
297 material, which may or may not be saturated with red lead. One quadrant, that marked A in figure 4, is shown with the binding thereon, the other part being shown uncovered, so that the construction of the ring or annulus of packing may thereby be better understood. Figure 5 shows a transverse section of this ring and need not be herein further referred to.

Having now described the nature of my said invention and the manner in which the same is or may be used or practically carried into effect, I would observe, in conclusion, that what I consider novel and original, and therefore claim as the invention secured to me by the hereinbefore in part recited letters patent, is the combining to-

(1 SHEET)

A.D. 1866. Aug. 11. Nº 2064.
KEIRBY'S SPECIFICATION

FIG. 4.

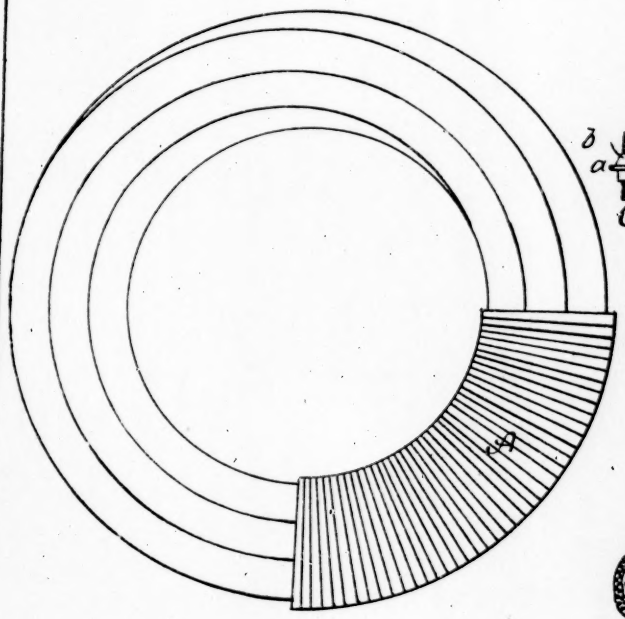


FIG. 1.

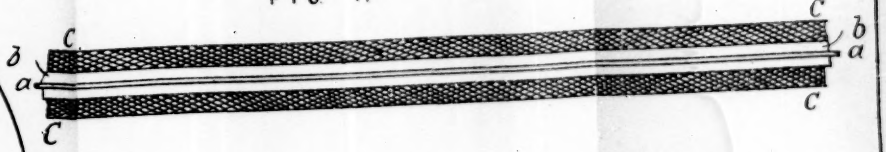
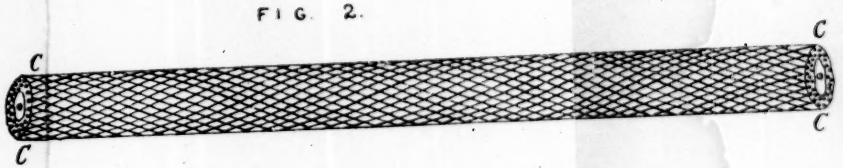


FIG. 2.



No. 305.
Magowan et al.
v.
My. B. & P Co.
} 295a

FIG. 5.

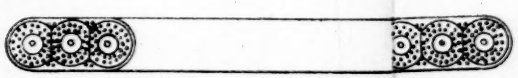


FIG. 3.



gether India rubber or other flexible substance with wire or hemp or other suitable fibrous material for the production of packing to be used for steam, water, air, gas tight, and other joints, as hereinbefore described, or any mere modification thereof.

In witness whereof I, the said John Edwin Keirby, have hereunto set my hand and seal this ninth day of February, one thousand eight hundred and sixty-seven.

JOHN E. KEIRBY. [L. S.]

Ex'd: M. McK.; J. A. W.

(Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *v.* Magowan & *als.* Defendants' Exhibit "Keirby English Patent, 1866," Lewis W. Scott, examiner.

298 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the bound volumes of this office of the provisional specification and drawing in the matter of the English letters patent granted Francis Wise March 8, 1865, number 647, for "an improved packing for piston rods and other rods."

In testimony whereof I, R. G. Dyrenforth, acting Commissioner of Patents, have caused the seal of the Patent Office to be [SEAL.] affixed this 30th day of October, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

R. G. DYRENFORTH,
Acting Commissioner.

299 A. D. 1865, 8th March. No. 647.

Packing.

(This invention received provisional protection only.)

Provisional specification left by Francis Wise at the office of the commissioners of patents with his petition on the 8th March, 1865; a communication from abroad by William Bolivar Davis, of Brooklyn, in the county of Kings, State of New York, United States of America, engineer.

I, Francis Wise, of Chandos Chambers, Adelphi, in the city of Westminster, consulting engineer, do hereby declare the nature of the said invention for "an improved packing for piston rods and other rods" to be as follows:

This improved packing consists of a body or cord composed of canvas or other textile fabric or fibrous material, round which is woven, interlaced, or braided a fabric composed of fine wires, as hereafter described. The packing thus formed is applied to stuffing

boxes in the usual manner, and presents a durable metallic surface capable of yielding when the packing is compressed.

(Here follows diagram marked p. 299*a*.)

In the annexed drawing, A is a cylindrical strip or cord of packing, and is composed of a body, *b*, of canvas or other textile fabric or fibrous material inclosing a core, *a*, of rubber. Round the strip A are interlaced or woven the wires *e* and *e'*, which constitute a compact metallic covering or fabric of wires, which may be woven round the strip or plaited or braided or interlaced, the usual whip plaiting or the ordinary braiding machine being used for the purpose.

300 The metal-covered packing is applied and secured in the ordinary manner—that is, by coiling it and depositing the coil in the stuffing box. When one portion of the metal covering has been worn away the packing may be removed and turned so as to present a new wearing surface, this operation being repeated until every portion of the metal has been worn away.

Although I have alluded to the interior portion or body *a* as being cylindrical, it will be apparent that it may be square or of any other required shape, and the core of rubber may, if desirable, be dispensed with.

Ex'd: E. L. L.; C. F.

(Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *vs.* Magowan & *als.* Defendants' Exhibit Wise Patent, Lewis W. Scott, examiner.

301 UNITED STATES PATENT OFFICE.

JAMES P. MCLEAN, of Brooklyn, New York.

Letters Patent No. 63071, dated March 19, 1867.

Improvement in Piston Packing.

The schedule referred to in these letters patent and making part of the same.

To all whom it may concern:

Be it known that I, James P. McLean, of the city of Brooklyn, in the county of Kings, and State of New York, have invented a new and useful improvement in steam or other packing for piston rods, cylinders, or shafting; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, which are lettered to correspond with and form a part of the specification.

To enable those skilled in the manufacture and use of steam and other packing to construct and use my improvement I will describe it as follows:

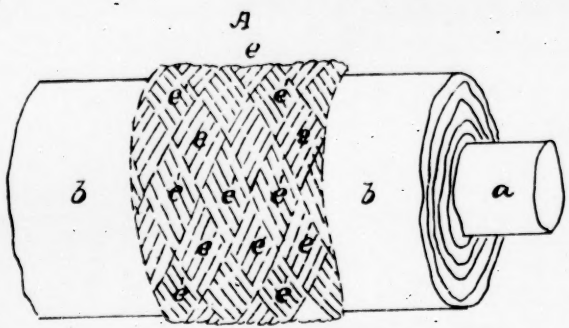
(Here follows diagram marked p. 301*a*.)

299a

(1 SHEET)

A.D. 1865. MAR. 8. Nº 647.
WISE'S PROVISIONAL SPECIFICATION.

No. 305.
Magowan et al.
Ny. B'k & P. Co.
} p. 299a



301a

J. P. McLean,

Piston Packing.

No. 63,071. Patented Mar. 19, 1867.

No 305.
Magowan et al.
Mf'g U. S. B. & P. Co.
} p. 301a

Fig. 3.

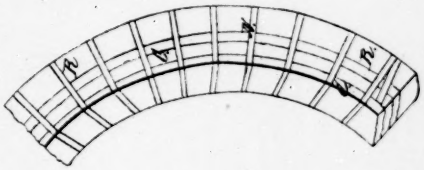


Fig. 2.

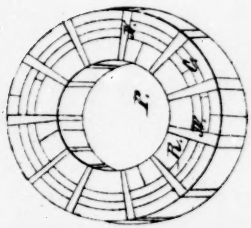
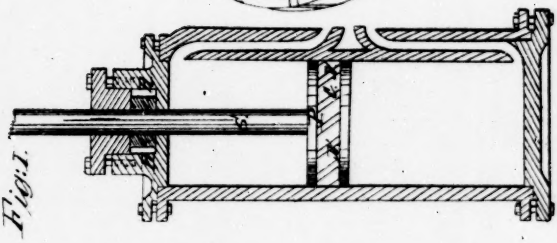


Fig. 1.



Witnesses:
John Vandecar
A. R. H. Burt

Inventor:
James P. McLean

Figure 1 is a perspective drawing of a steam cylinder, with piston P, and rod S, provided with my improved packing, R C, which improvement consists in combining India rubber, R, and cork, C, in such a manner that the rubber will act as a follower to the cork when in the stuffing-boxes or piston, thus holding the cork and zinc or lead against the cylinder or rod S.

I am aware that cork and lead are claimed in the application of James P. McLean and John Vandercar for improvements in steam or other packing, allowed May 15, 1866, and that India rubber has been used for packing purposes, with canvas and lead, hence they are not claimed as my invention in this application when combined as above; but my invention consists in the combination of two elastic bodies or substances of different expansive and absorbent properties, so arranged that the absorbent body C will be forced and held against the rod, shaft, or cylinder, by the more expansive and more elastic substance, India rubber, R.

I find, from a more careful analysis, that the first introduction of steam into a cylinder (packed with cork alone) will cause a shrinkage of the packing to take place; hence it becomes necessary to put in more packing or employ some other means to fill up the vacuum; consequently the India rubber or caoutchouc R, is more expansive and retains its expansion, so that it counteracts the aforesaid shrinkage, and keeps forcing the cork C against the cylinder or rod, (when placed behind the cork,) as shown in the accompanying drawings, by which means the quirks of the absorbent C become filled with the leaden particles and lubricating oil, thereby making the packing perfectly steam-tight. In my opinion the cork, when filled as above, forms a lubricating packing equal to black lead (after shrinkage has been overcome by the means set forth in the above).

I secure the rubber R and cork C together by zinc or leaden strips wound around the same, as shown at N N′ in the drawings, and for practical purposes I would harden the lead a little by the introduction of "antimony" into its composition preparatory to rolling into sheet lead, from which I cut the strips N′ N′, and when the zinc strips N N are used in lieu of lead, in combination with the cork C, they will be found sufficiently hard for all ordinary packing purposes, and when forced against the piston-rod or cylinder, they become embedded into the packing C, and hold the same into shape without canvas or other jackets. I prepare the cork C, if necessary, by coating it with a composition of black lead and pulverized soapstone or "talc," or the above may be used separately for filling up the quirks of the cork, and protecting it (the cork) from burning, as well as to facilitate its great lubricating properties when prepared as above set forth.

Therefore what I claim as new and useful, and what I wish to secure by letters patent of the United States of North America, is—

Combining the cork C, rubber R, with or without the mineral coating, and securing the same by means of metallic strips, all substantially as described and for the purpose set forth and shown in the drawings.

In testimony whereof I hereunto subscribe my name in the presence of two witnesses.

JAMES P. McLEAN.

Witnesses:
JOHN CURTIS.
JOHN VANDERCAR.

302 (Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *v.* Magowan & *als.* Defendants' Exhibit "McLean's Patent," Lewis W. Scott, examiner.

303 DEPARTMENT OF THE INTERIOR,
UNITED STATES PATENT OFFICE.

To all persons to whom these presents shall come, Greeting:

This is to certify that the annexed is a true copy from the records of this office of the letters patent granted Charles McBurney June 28, 1859, number 24569, for improvement in packing for stuffing boxes of pistons.

In testimony whereof I, R. G. Dyrenforth, acting Commissioner of Patents, have caused the seal of the Patent Office to be [L. S.] affixed this 30th day of October, in the year of our Lord one thousand eight hundred and eighty-four, and of the Independence of the United States the one hundred and ninth.

R. G. DYRENFORTH,
Acting Commissioner.

304 No. 24569.

UNITED STATES OF AMERICA:

To all to whom these letters patent shall come.

Whereas Charles McBurney, of Roxbury, Massachusetts, has alleged that he has invented a new and useful improvement in packing for stuffing boxes of pistons, which he states has not been known or used before his application; has made oath that he is a citizen of the United States; that he does verily believe that he is the original and first inventor or discoverer of the said improvement, and that the same hath not, to the best of his knowledge and belief, been previously known or used; has paid into the Treasury of the United States the sum of thirty dollars, and presented a petition to the Commissioner of Patents signifying a desire of obtaining an exclusive property in the said improvement and praying that a patent may be granted for that purpose:

These are, therefore, to grant, according to law, to the said Charles McBurney, his heirs, administrators, or assigns, for the term of fourteen years from the twenty-eighth day of June, one thousand eight hundred and fifty-nine, the full and exclusive right and liberty of making, constructing, using, and vending to others to be used the said improvement, a description whereof is given in the words of

C. McBURNEY.

306 a

Rubber Fabrics.

No. 24,569.

Patented June 28, 1859.

No. 305.
Magowan et al.
v.
My. B. & P. Co.
} p. 306 a

Fig 2

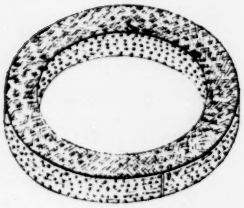


Fig 1



Fig. 3

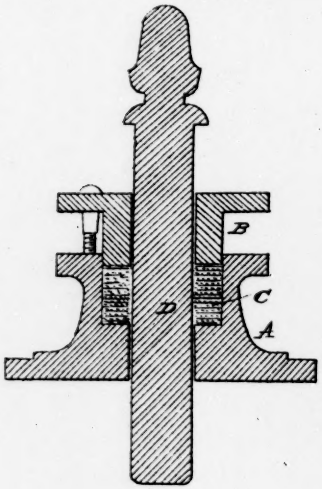


Fig 4



Fig. 5



Witnesses
Thos. R. Houck
Sam Cromwell

Inventor
Chas. McBurney

the said Charles McBurney in the schedule hereunto annexed, and is made a part of these presents.

In testimony whereof I have caused these letters to be made patent, and the seal of the Patent Office has been hereunto affixed.

305 Given under my hand, at the city of Washington, this twenty-eighth day of June, in the year of our Lord one thousand eight hundred and fifty-nine, and of the Independence of the United States of America the eighty-third.

[L. S.]

JACOB THOMPSON,
Secretary of the Interior.

Countersigned and sealed with the seal of the Patent Office.

WM. D. BISHOP,
Commissioner of Patents.

306 *Specification Forming Part of Letters Patent No.* 24569, *Dated June* 28, 1859.

To all whom it may concern:

Be it known that I, Charles McBurney, of Roxbury, in the county of Norfolk and State of Massachusetts, have invented a new and useful packing for the stuffing boxes of piston and valve rods, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification,

(Here follows diagram marked p. 306*a*.)

in which Fig. 1 is a plan of the packing in the sheet; Fig. 2, a strip as it is bent into a circle when it is in use.

Fig. 3, a section through a stuffing box with the packing inserted.

The hempen packing heretofore employed in stuffing boxes is not easily adjusted so as to produce a uniform pressure upon all sides of the rod, and an elastic, durable and substitute for it has long been a desideratum.

In experimenting for this purpose I have laid together a suitable number of plies of canvas or cotton cloth with India rubber between them, forming a cake of packing, which was afterwards cut into strips. This was found to be objectionable for three reasons—1st, the longitudinal threads of the canvas rendered the strips of packing very difficult to bend so as to insert it into the stuffing box; 2nd, the short transverse threads prevented the packing from yielding with a sufficient ease when the follower was brought down upon it; 3rd, the longitudinal threads of the strips were drawn out of place by the motion of the rod, leaving the packing with an uneven surface.

307 The same packing was then cut into rings, the inner circle of which was of the diameter of the rod and the other circle of a diameter just sufficient to fill the stuffing box; but it is obvious that this method of cutting the packing is very wasteful of mate-

I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, which represents a perspective view of a strip of packing made in accordance with my invention.

My invention relates to packing of the kind for which letters patent were issued to Charles McBurney on the 28th June, 1859. This packing, which is usually employed in the stuffing boxes of pistons, is composed of plies of cloth or canvas cut bias, coated with rubber, and pressed together and vulcanized.

When thus made the packing is very solid and possesses but little elastic property, so that as it wears there is some difficulty in maintaining a tight joint between it and the piston. To obviate this disadvantage is the object of my invention, which consists in forming the packing with a backing of pure vulcanized rubber, or rubber of sufficient elasticity for the purpose desired, which may be covered and protected by a strip of canvas or other suitable fabric.

In the drawing, *a* represents the ordinary packing band, which is backed by the rubber strip *b*, the whole being vulcanized together so as to be solidly united; and the rubber may be covered, if desired, by the canvas strip *c* to protect it from injury. When the packing is placed in the stuffing box and around the piston, and the follower is screwed down so as to compress the packing, the
313 rubber strip will also be compressed and forced against the sides of the stuffing box, and as it cannot expand in the direction of the follower it acts as a spring to hold the packing against the piston rod and to prevent leakage, compensating for any slight wear in the packing and making a tight joint between the rod and the packing.

It would be manifestly impracticable to impart this quality of elasticity to the body of the packing, or that part which is in contact with or bears against the rod, but by backing it with an elastic cushion, which, upon being compressed between the follower and the sides of the stuffing box, acts as above described, the packing is possessed of every qualification required for its successful use, and a tighter and better joint is made than has heretofore been practicable.

Having now described my invention and the manner in which the same is or may be carried into effect, what I claim and desire to secure by letters patent is—

The combination, with the packing such as herein specified, of an elastic backing or cushion of vulcanized India rubber, substantially as and for the purposes set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

D. C. GATELY.

Witness:
HENRY BEERS GLOVER.
FLORENCE T. GLOVER.

314 *Oath.*

STATE OF CONNECTICUT, } ss:
County of Fairfield, }

On this 31st day of December, 1868, before the subscriber, a notary public, personally appeared the within-named Dennis C. Gately and made solemn oath that he verily believes himself to be the original and first inventor of the herein-described improvements in vulcanized India-rubber packing; that he does not know or believe that the same was ever before known or used, and that he is a citizen of the United States of America.

HENRY BEERS GLOVER,
[L. S.] *Notary Public for State of Connecticut.*

315 (Indorsed:) Patent—Jan. 7, 1869—Office. Memorandum of fee paid at U. S. Patent Office. Hand. $20. Inventor, Dennis C. Gately; invention, anti-rattler; date of payment, Jan. 15, 1869; fee, $20; solicitor, A. Pollok.
(Indorsed:) Patent—Jan. 15, 1869—Office.
[Endorsed:] Patent—Jan. 15, 1869—Office.

316 1869. Hedrick.
10092.
Assigned.

No. 86296.

Dennis C. Gately, ass'or to New York Belting and Packing Company,
Of Newtown,
County of Fairfield,
State of Connecticut.

Vulcanized India-Rubber Packing.

Rec'd Jan'y 7, 1869.
Petition, " " "
Affidavit, " " "
Specification, " " "
1 drawing, " " "
Model, " " "
Cert. dep., ——.
1. Cash, $15, Jan'y 7, 1869.
Add'l fee cert., ——.
" " cash, $20, Jan'y 15, 1869.
Examined Jan. 8, '69. B. S. Hedrick.
1. Issue. Grinnell. Jan'y 9, '69.
4. Patented Jan. 26, 1869.
Recorded, vol. —, page —.
Circular, Jan'y 12, '69.
A. Pollok, pres't. 1869.

317 1869. Martin.

B. 76.
Improved vulcanized-rubber packing.
Dr'g, $1.25; spec., 50c.
Ex'd: C. F.; E. L. L.
1869.

318 (Indorsed:) United States circuit court, district of New Jersey. New York Belting and Packing Co. *vs.* Allen Magowan *&c'als.* Complainant's Exhibit "Gately File Wrapper, &c." Lewis W. Scott, examiner.

319 UNITED STATES OF AMERICA, }
District of New Jersey, } *ss:*

I certify the foregoing to be a true and faithful copy of the record and proceedings of the circuit court of the United States in and for the district of New Jersey, in the third circuit, in a certain suit in equity therein lately depending between The New York Belting and Packing Company, complainants, and Allan Magowan, Spencer M. Alpaugh, and Frank A. Magowan, defendants.

The Seal of the U. S. Circuit Court, Dist. of New Jersey.

In testimony whereof I have hereunto subscribed my name and affixed the seal of the said circuit court, at Trenton, in said district, this twenty-eighth day of October, A. D. eighteen hundred and eighty-seven, and in the one hundred and twelfth year of the Independence of the United States.

S. D. OLIPHANT, *Clerk.*

Endorsed on cover: New Jersey C. C. U. S. No. 305. Allen Magowan, Spencer M. Alpaugh, and Frank A. Magowan, appellants, *vs.* The New York Belting and Packing Company. Filed November 28, 1887.

Office Supreme Court U. S.
FILED,
FEB 25 1891
JAMES H. McKENNEY,
CLERK.

MacCrellish & Quigley, Printers, Trenton, N. J.

Supreme Court of the United States

October Term, 1890. No. 305.

ALLEN MAGOWAN, SPENCER M. ALPAUGH AND FRANK A. MAGOWAN, Appellants,

vs.

THE NEW YORK BELTING AND PACKING COMPANY.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF NEW JERSEY.

Brief for Appellants.

F. C. LOWTHORP,
Of Counsel with Appellants.

was ordered, and the report of the Master was duly confirmed; and on the 28th day of September, 1887, a final decree was entered by which it was decreed that the complainant recover of the defendants the sum of nine thousand and twenty-six dollars and sixty-six cents profits, together with the taxed costs.

SPECIFICATION OF ERRORS.

The appellants insist that the court below erred.

First. Because it found the patent sued on valid; whereas it is insisted that the same is invalid, null and void.

Second. Because it found that the patent sued on was not anticipated by English letters patent No. 1,865, of the year 1854, granted to J. H. Tuck; whereas it is insisted that said patent sued on is anticipated by the said English letters patent.

Third. Because it found the patent sued on valid in view of the state of the art, because it disclosed invention; whereas it is insisted that in view of the state of the art the said patent discloses no invention whatever, and is therefore null and void.

Fourth. Because it found the patent sued on reveals invention in that it discloses a new and better method of obtaining a tight joint between the packing and the piston rod than had theretofore been shown by any combination of elements, new or old; whereas it is insisted that said patent did not show a new and better method of obtaining a tight joint as aforesaid.

Fifth. Because the court found that the article patented in the patent in suit went at once into such extensive public use as almost to supersede all packings made under other methods; whereas it is insisted that the evidence in the cause shows that such was not the case.

Sixth. Because it assumed that the use of the patented article by the public implied invention in the production thereof; whereas it is insisted that no such implication can properly be held to have arisen in the premises.

THE ARGUMENT.

The main contention of the appellants in this cause is that the patent in suit is invalid by reason of the anticipation of its subject-matter by at least one of the patents set up in the answer, to wit: English letters patent No. 1,865, of A.D. 1854, granted to J. H. Tuck; and also that the said patent in suit is void because it discloses no invention on the part of the applicant in view of the state of the art.

For convenience in argument, the anticipating patents above referred to will be commented on in a general resumé of the state of the art.

Gately's object in the production of his patented packing was the combination of a flexible, oil-absorbing, reasonably durable-wearing surface of a packing, with a suitable spring for holding the wearing surface against the rod, the whole article of manufacture being formed in one piece in a manner adapting it to convenient use. The question is whether, in forming this combination, he produced anything new in the sense of the patent statutes.

Gately candidly states in his specification (*Record, page* 153), that he adopts as the wearing strip for his packing the "ordinary packing band," as he calls it, theretofore patented to Charles McBurney, and long manufactured in the shop in which Gately was the superintendent. He describes this packing as being composed of layers of canvas cut bias, coated with India rubber, pressed together and vulcanized (the McBurney patent appears at page 117 of the record), and says of it: "The packing is very solid, and possesses but very little elastic property, so that as it wears there is some difficulty in maintaining a tight joint between it and the piston.

"To obviate this disadvantage is the object of my invention, which consists in forming the packing with a backing of pure vulcanized rubber, or rubber of sufficient elasticity for the purpose desired, which may be covered and protected by a strip of canvas or other suitable fabric."

Speaking further of the inelasticity of the McBurney wearing strip, he says:

"It would be manifestly impracticable to impart this quality of elasticity to the body of the packing, or that part which is in contact with or bears against the rod, but by backing it with an elastic cushion, which, upon being compressed between the follower and the sides of the stuffing-box, acts as above described, the packing is possessed of every qualification required for its successful use, and a tighter and better joint is made than has heretofore been practicable."

His claim is as follows:

"The combination, with the packing, such as herein specified, of an elastic backing, or cushion of vulcanized India rubber, substantially as and for the purposes set forth."

From the specification itself it is thus seen that Gately took an old and well known wearing strip, and, by an old and well known process long practiced by Gately himself, in common with almost all rubber manufacturers, viz., vulcanization, united with it a vulcanized rubber backing to force the wearing strip against the rod. As will be observed, Gately states in his specification that it would be *manifestly* impracticable to impart elasticity to the wearing strip but by backing it with an elastic cushion. By his own admissions, then, we find placed before Gately his wearing strip, the process of vulcanization, and the need of an elastic cushion to force the strip against the rod. With all this before him it might be possible to say truly that Gately was an inventor had he been the first to apply an elastic cushion or backing to a wearing strip or packing, but he was not the first to do this thing. It will be shown to the court that vulcanized rubber springs for such purposes had been long in use; that such springs had been united by vulcanization with wearing strips composed of precisely the same material as composed the McBurney wearing strip; that some of these older wearing strips so backed by elastic cushions of vulcanized India rubber were almost precisely in the same form as the McBurney packing, and that in fact, almost the identical Gately packing had been in public use all over the world for many years prior to Gately's application for his patent.

THE STATE OF THE ART.

Early in the present century the art of forcing the wearing surface of a piston packing against the rod by springs, so as to take up wear, follow inequalities of the rod and make a tight joint, was well known. (*See Brevoort's deposition, page* 133.) The springs so used in those times were metallic; but when vulcanized rubber began to assume its place in the arts, and was found to be a good material for springs, it began to usurp the place of metal for such packing springs as well as for springs under railway carriages and other uses. Complainant's expert witness, Brevoort, says (*page* 133 *of the record*) that the substitution of vulcanized rubber springs for metallic springs in piston packing was begun before the year 1850.

Used in the stuffing-boxes of pistons, an elastic rubber spring works somewhat differently from a metallic spring. It transmits pressure towards the point of least resistance and not necessarily in a straight line, as would a metallic spring, but converts motion or pressure made at right angles thereto against the wearing surface of the piston rod. (*See Wiegand's deposition, page* 74; *Brevoort's deposition, page* 134.)

The use of elastic rubber springs in piston packings is clearly shown in the patents to Tuck, McLean, Wise and Keirby (*see record, pages* 157 *to* 176, *both inclusive*), and before directing the attention of the Court to the various improvised packings having vulcanized rubber springs, which the evidence in the cause showed were made and used by a number of the witnesses long before Gately made his packing, it will be profitable to make a short examination of these several patents.

EARLIER PATENTS.

English letters patent of A. D. 1852, granted to J. H. Tuck, is found on page 162 of the record. In his specification, Tuck says (*page* 163): "The object of this invention is to make an enduring packing for piston-rods, pistons, valves, stuffing-boxes, bearings and other rubbing surfaces.

Instead of hemp or metal packing as heretofore, I construct a packing composed partly of yielding and partly of rigid substances. The elastic part of the packing i-, by preference, composed of rolls or folds of canvas coated with India rubber, and in the tubes or ribs of this stuffing I sometimes insert strands or blocks of India rubber. The hard substances that I u e in conjunction therewith are segmental or other suitably shaped pieces of wood or metal, which are intended to lie or work in contact with the metallic surface, whether moving or stationary (as the case may be), against which the packing is intended to bear, the segmental or other shaped pieces being kept up to the rubbing surface by the elastic pressure of the yielding substance. In order the better to insure the proper action of this substance in glands or stuffing-boxes, I give the interior of the gland a conical form, and I insert in the stuffing-box a conical filling piece, which will answer the same purpose. By this means the pressure downward of the gland or cover of the box will insure the proper binding of the packing around the piston-rod. * * gmental pieces may be put together so as to present a continuous hard surface to the piston-rod in the form of a tube, the pieces being put together as rings, forming break-joints and locking the one ring into the other, to prevent the independent movement of any piece, or between the rings the elastic material may be interposed, so as to present a varied packing surface of alternate rings of flexible or elastic combined with rigid or unyielding materials." He then goes on more clearly to specify his improved packing by reference to the several drawings of the patent.

This patent clearly shows a means of packing stuffing-boxes with a packing which presents to the rod a wearing surface having always a uniform character. It further shows this wearing surface backed by an elastic cushion and kept constantly in place by means of the gland or follower which is adjusted from time to time as the surface of the packing gradually wears away.

The next patent in chronological order is English patent, No. 1,865 of A.D. 1854, granted to J. H. Tuck, and found on page 156 of the record. This is a patent for "Improve-

ments in packing for pistons, piston-rods, valves and other uses." The patentee says in his specification (*page 157 of the record*): "My invention * * * is intended to combine a flexible material with an elastic material in such manner as to cause the former to be constantly kept in contact with the rubbing or bearing surface by the elasticity of the former [latter], and this object is accomplished by constructing the packing with a block or core of India rubber or other suitable elastic material, surrounded or covered by folds of flexible material or fabric, the India rubber block or core being so placed and arranged and of such a form and size as to be calculated by its elasticity to keep the fabrics against the wearing or bearing surface during the wear of such fabrics. In some cases it might be sufficient to place the India rubber in combination with the flexible materials without the former being covered by the latter.

"I prefer that the flexible material should be that of canvas coated or saturated with a solution of India rubber or other suitable composition; but this material may be varied. I also prefer in some cases, that a block or core of India rubber inclosed therein should be placed or arranged within the roll of packing in a position further from the wearing or bearing surface than the centre of such roll; also that the said block or core should be formed oblong or oval, but it may be of any convenient form and either solid or tubular, and may be placed in the center of the roll.

"In order to manufacture a roll of packing with the block or core out of the centre a portion of the flexible material or fabric is folded about the greatest diameter or thickness of the block or core, and the two bodies thus formed are folded in the remainder of the flexible fabric required to form the roll of packing; and in order to manufacture a roll of packing with the block or core in the centre, the flexible material or fabric may be simply folded on the block or core."

He then goes on to refer to the several figures in his drawings which disclose sections of the various forms of packing preferred by him. Several of these, notably Figures 4, 5 and 9, disclose packings which are substantially similar to the packing claimed in the pattern in suit here. He further says:

"It will be evident from these examples that the mode of binding the elastic block or core with the flexible material or fabric may be varied. I would also remark that I have not thought it necessary to explain any mode or means of applying the packing, as these are all well known, and my invention does not relate to them."

This patent discloses a packing having the wearing portion composed of plies of woven fabric combined with each other by means of the preparation of India rubber and backed with an elastic strip of India rubber which is in turn covered by a cloth to protect it from injury or to attach it firmly to the wearing portion of the packing. It will also be noticed that the patentee states that it may be sufficient to place the India rubber in combination with the flexible material composing the wearing surface of the packing without covering the rubber with the flexible material. In other words, he proposes a backing attached in the same manner that Gately attaches his, to wit, by vulcanizing or some similar process.

The next patent to which the Court is referred is U. S. letters patent No. 13,145 for "Steam Engine Packing," granted to J. H. Tuck, dated June 26th, 1855. In the specification of this patent (*page* 160 *of the record*) the patentee says: "I first take canvas or other suitable material, saturate it with a solution of India rubber or other equivalent composition. I then cut the canvas thus prepared in a diagonal manner into strips of any required width, cement the diagonal ends together so as to form any length of fillet required, then roll it up into a roll and allow it to cement in the form of an elastic or flexible roll of any suitable diameter required. In cases where greater elasticity is required I roll the canvas around a core or centre-piece of India rubber or other suitable elastic material."

It will be observed that this patent specifically discloses or mentions a bias cut of the fabric of which the wearing portion of the packing is made, by which bias cut greater flexibility of the roll is obtained.

The next patent to which the Court's attention is directed is that granted to James P. McLean, being U. S. letters patent No. 63,071, dated March 19th, 1867, for an "Improve-

ment in Piston Packing." (*See page* 174 *of the record.*) This patent discloses a packing having a wearing surface of cork united by metallic binding strips to a backing of India rubber. The patentee specifies that upon the introduction of the cork packing into the steam cylinder the cork shrinks, and, in order to obviate repacking, he places behind the cork a strip of elastic rubber, which keeps the wearing surface of the cork against the rod. This patent shows simply another method of obtaining an elastic-backed piston packing, the general shape of which is exactly similar to the packing claimed by the patent in suit.

English patent No. 19, of 1865 (*page* 168 *of the record*), granted to Edward Keirby for "Improvements in the Manufacture of Elastic Packing for Pistons, etc.," shows a packing made of plaited flax, hemp or other suitable fibrous material containing an elastic core of vulcanized India rubber or other suitable material.

English patent No. 2,064, of August 11th, 1866, granted to John Edward Keirby, (*see page* 171 *of the record*), shows a somewhat similar packing having an elastic rubber core covered with wire and used in the same manner as the other patented packings referred to.

English patent, No. 647, of 1865, granted to Francis Wise for "packing" (*see record, page* 173), shows a packing consisting of a body or core of canvas or other suitable textile fabric or fibrous material around which is woven, interlaced or braided a fabric composed of fine wire. The patentee says: "A packing thus formed is applied to the stuffing-boxes in the usual manner, and presents a durable metallic surface, capable of yielding when the packing is pressed" He shows in his patent a core of rubber marked "a" in the drawings. This constitutes another packing of a character generally similar to those hereinbefore described, in that the wearing surface of the packing is forced against the rod by means of the elastic core which constitutes a backing thereto.

These several patents make up the published state of the art so far as it is disclosed in the evidence in this suit. The state of the practiced art is testified to by a number of witnesses. Several exhibits were introduced by the defendants showing extemporized packings, all of which exhibits

have disappeared. They were probably lost during the removal of the office of counsel for appellants since the final hearing below. They were defendants exhibits "A," "B," "C," "D," "E," "F," "G" and "H." The exhibits "A," "B," "C," "E," "F" and "G," merely represented pieces of pure gum, and pieces of hose cut up for the purpose of illustration and to show how the packings "D" and "H" were made. (*See Brevoort's deposition, page* 116.) Exhibits "D" and "H," were examples of extemporized packing made and used by the witnesses William F. Harrison and S. Lloyd Wiegand. Fortunately these exhibits "D" and "H" are so clearly described by the witnesses Harrison and Wiegand (*pages* 24, 25, 26 *and* 63), that their loss cannot work irreparable mischief to the appellants. They were composed of narrow strips of rubber hose (the plies of duck therein being cut bias so as to expose the ends of the threads to wear) placed edgewise against an vulcanized strip of India rubber and fastened thereto by lamp-wick lashings.

It is shown by the testimony of the witness James Lever, that for twenty-five years past he had taken charge of steam engines used by him at his book-bindery in Philadelphia, and had packed those engines many times (*see record, pages* 47, 48), and he described the various kinds of packing he had used (*record, pages* 48 *to* 55). He stated (*page* 55,) that he had used gum hose as a packing, cutting it up into strips for the purpose. That the hose he used was garden hose made of cotton webbing [duck] coated on the outside with rubber. With a strip of hose Lever illustrated the method of putting gum hose packing into the stuffing-box, and showed that it was placed with the edges of the laminæ of duck bearing against the piston-rod, *i. e.*, that the planes of the laminæ of duck were vertical to the side of the rod. (*See page* 50.) He stated that he used strips of hose in this way as a packing in Philadelphia, Pa., at about the breaking out of the war; and that among the engines in which he used it was one which he had purchased from S. L. Wiegand (another of the defendant's witnesses); such use occurring in 1863. (*See page* 52.) Upon his cross-examination his statements are confirmed.

The witness William F. Harrison testifies that during the war he was employed in the Confederate service on gunboats on the James river, Virginia, and that while so employed he at various times packed the stuffing-boxes of engines with strips of hose cut for the purpose, the duck in such strips being cut bias. This witness also testified that in the same service he had used such strips of hose cut bias for piston packings and had inserted between such strips and the walls of the stuffing-box strips of pure gum which he fastened to the strips of hose with lashings of lamp wick. He exemplified these packings in the lost "Exhibit D." (*See record, pages* 25 *and* 26.) This witness recognized the packings shown in figures 4 and 9 of the drawings of Tuck's English patent of 1854 as packings which he had used. He testified that he had sometimes cut down these packings (figures 4 and 9) so as to introduce them into the stuffing-boxes which they were too large to fit; then when he cut them down he removed a part of the fibre side and placed the gum backing next to the outside walls of the stuffing-box; and that when so cut down many of the layers of the duck composing the wearing portion of the packing stood vertically against the rod when the packing was first introduced into the box. (*See record, pages* 27 *and* 28.) The only vessel which he can clearly identify as one upon which he so cut and used the Tuck packing, Nos. 4 and 9 of the English patent of 1854, was the Hero, a Venezuelan steamer; and he states that he so cut them on that steamer in 1874 (*see record, page* 29), but he states that he had cut down Tuck's packings in that manner as far back as 1863. (*See record, page* 29.)

William W. Smith, an engineer and machinist in Philadelphia, and formerly an assistant engineer in the U. S. Navy, testifies to the use of various extemporized packings for stuffing-boxes while in that service. He testifies to his having cut strips of hose and used them for this purpose, the duck in the hose being cut bias. Such use was on the monitor Sangamon off Charleston, in 1865. (*See record, pages* 39 *and* 40.) He further testifies to having used Tuck's packing made similar to that shown in figure 9 of Tuck's English patent No. 1865, of the year 1854, on the U. S. war

vessels Sangamon and Canandaigua. He also states that if the packing was too large to fit the box they cut off the canvas side, retaining the rubber backing which was placed next to the sides of the stuffing-box, and they brought the edges of the canvas strips next to the rod. *See record, pages* 38 *to* 41.

The witness S. Lloyd Wiegand testifies to the use by himself and others during the war of strips of hose and rubber belting as packing for stuffing-boxes; and states that these pieces were cut bias of the laminæ of the cloth composing them, and were placed with their edges to the rod; and that they attached a backing of elastic rubber to these strips of hose or belting by means of lamp-wick lashings, and placed the rubber backing against the sides of the stuffing-box. (*See record, pages* 61 *to* 64.) This witness also states on cross-examination that among others whom he had seen use strips of rubber belting for packing an engine was one Parry, and that he saw said Parry use such a strip on the first successful steam fire engine in the city of Philadelphia. (*See record, page* 92.) He also testifies to having seen other persons use such strips for packing the stuffing-boxes of steam engines.

The complainant endeavored to weaken this testimony concerning the practiced state of the art by calling several witnesses, who testified that they had never seen strips of hose used as packing, and who declared they had never cut down Tuck's packing in the manner described by these witnesses. The witness Ebenezer Roby was called by the complainant and *endeavored* to prove that no such packings as are shown in Figures 4 and 9 of the drawings of Tuck's English patent of 1854 had ever been in use; while complainant's expert witness, Brevoort, testified that he *thought* they had tried to make a sample like Figure 9 of said patent, but had not succeeded in producing a packing which was of practical use (*See page* 144.) Admitting the truth of these statements, what do they prove? There are three witnesses on the part of the defendants who testify to having seen such packings, and these witnesses are certainly not discredited in any way. They are William F. Harrison, William W. Smith and S. Lloyd Wiegand. The witnesses

Harrison and Smith both swear that they used Tuck's packing like the forms shown in section in the Figures 4 and 9 of the patent of 1854; and Wiegand testifies positively that he has seen samples of such packing at the Philadelphia Navy Yard and at the Franklin Institute in Philadelphia. (*See pages* 96 *and* 97.)

It is submitted, however, that the drawings of this patent constitute a sufficient disclosure of these forms of Tuck's packing to make it quite unnecessary that any samples of the concrete article should be proved to have existed.

In reviewing the proofs in the cause, it would indeed seem hardly necessary to devote much attention to an examination of the testimony bearing upon the use of the expedients exemplified in the lost exhibits "D," "H," inasmuch as the prior patents set up by the defense show a state of art which leaves no room for invention in the production of the Gately patented packing.

It is quite unnecessary to refer the Court to the statements of the expert witnesses on both sides concerning the functions of the several elements which go to make up the various patented packings shown. It is obvious that the wearing strips of the Tuck, Wise, Keirby, McLean and Gately packings all perform the same function when in use; that is, they present to the rod a wearing surface of a reasonably durable character, capable of absorbing lubricants and adapted to prevent undue wearing of the rod. It is equally obvious that the elastic rubber cushions of these various packings, however located relatively to the wearing surface of the packing, perform the function of forcing the wearing surface against the rod, following up inequalities of the rod and taking up wear. In some of the packings, viz., Keirby's, Wise's and in some forms of Tuck's, this cushion is located in the middle of a roll of wearing material, but in these cases the function of the cushion is the same as in Gately's packing, that portion of the roll of wearing material which lies between the elastic core and the outside walls of the stuffing-box being mere surplusage. (*See Wiegand's deposition, page* 75.) The location of the cushion relatively to the wearing portion of the packing is precisely the same in the packings shown in figures 4, 5 and 9 of Tuck patent of 1854,

and in the McLean patent and the packing shown in the Gately patent, and the forms of said cushion are precisely the same in cross-section in all three of these packings. There is no dispute on these points whatever, and to sustain the Gately patent against these prior patents the complainants seek to find other than functional differences between packings and their respective parts. It will be shown, however, very clearly that these differences, if they exist at all, are only in degree, and not in kind; and it will also be shown that if any difference in degree exists, it is very small.

The appellants insist that Tuck's English Patent No. 1,865, of the year 1854, is an anticipation of the Gately patent, and the Court's attention is now particularly directed to that matter.

It will be observed that Figure 9 of the drawing of that patent discloses a cross-section of a packing which is substantially similar to the Gately packing. The method of making that packing is somewhat different from the method of making the Gately packing, but it is submitted that the product is substantially the same in each case. Tuck in his specification (*see record, page* 157), says that he combines a *flexible* material or fabric with an *elastic* material so as to cause the flexible material to be constantly kept in contact with the rubbing surface. That he accomplished this object by constructing the packing with a *block* or core of *India rubber* or *other suitable elastic material* surrounded or covered by the folds of the flexible material or fabric; and he says further, in some cases it might be sufficient "to place the India rubber *in combination with the flexible material, without the former being covered by the latter.*" He says further that he prefers the flexible material should be that of *canvas coated* or saturated with a solution of *India rubber, or other suitable composition; but this material may be varied.*" He then mentions that he prefers in some cases to place the India rubber cushion outside of the middle of the roll. He then says:

"In order to manufacture a roll of packing with the block or core out of the center a portion of the flexible material or fabric is folded into a roll of about the greatest diameter

or thickness of the block or core, and the two bodies thus formed are folded in the remainder of flexible material required to form the roll of packing; * * *."

From the drawings of this patent (Figure 9) it will be seen that Tuck produces a packing of the same shape in section as is the Gately packing. From the description in the specification it will be seen that Tuck forms a *flexible wearing portion* for his packing. It wi l also be seen that this wearing portion is made of canvas or similar material, coated or saturated with a solution of India rubber or other suitable composition; but this material may be varied. He does not specifically mention in this particular patent that the fabric of which the wearing portion is made shall be cut *bias*, but he does mention that bias-cutting in his United States Patent No. 13,145 (*see record, page* 160); and the art of cutting such fabrics bias to add to their flexibility was commonly known at the time the patent under consideration was applied for. (*See Wiegand's deposition, page* 80.)

In the trial of the cause, complainant's expert witness endeavored to draw a distinction between the packing shown in this patent and Gately's packing by declaring, first, that the Tuck packing was not a vulcanized packing, while Gately's packing was; second, by declaring that the wearing surface of Tuck's packing was constantly changing in character when in use, while the wearing surface of Gately's packing always remained the same. It is submitted that the first point which this witness endeavored to make against the Tuck packing shown and described in the English patent of 1854 is not well taken.

There can be no reasonable question that in view of the state of the art as commonly practiced in 1854 and ever since, Tuck's patent showed a vulcanized packing, although the specific term vulcanization does not appear in his specification. As stated before, Tuck says that the flexible material should be coated with a solution of India rubber or other suitable composition; but this material may be varied. The art of vulcanizing rubber being well known at that time, the patent must be held to cover vulcanization and to show it. As a matter of fact, Tuck's packing has

always been a vulcanized packing. This is admitted by complainant's expert himself. On cross-examination (*record, page* 138), the witness Brevoort testifies as follows:

x Q. Have you ever seen any Tuck's packing which was not agglutinated with vulcanized India rubber?

A. Not since my experience with such materials commenced—about 1864 or 1865.

x Q. Did you ever before that time?

A. Never.

x Q. Did you ever know or hear of any Tuck's packing made or used that was not constructed in that way with vulcanized India rubber?

A. Practically, it has always been vulcanized so far as I know.

Again, on page 133 of the record he testifies as follows:

x Q When commenced the use of rubber for springs to force contact of the wearing surface of the packings upon the rods?

A. I do not know the date exactly; it must have been after the discovery of vulcanization, and probably some years afterwards.

x Q. This was done, was it not, as early as 1850?

A. Probably earlier.

Again, on page 137 of the record, Mr. Brevoort says:

x Q. Were vulcanizable solutions of India rubber known at the time of granting of this Tuck patent of 1854?

A. I do not know; I suppose they were, as I have seen very old patents for covering cloth with rubber and then vulcanizing it, but I cannot recall names and dates now.

Finally Mr. Brevoort admits that his expressed opinion that Tuck's patents showed only unvulcanized packings is a mere surmise on his part. He testifies (*page* 135 *of the record*) as follows:

x Q. What is your ground for thinking that Tuck carefully avoided the use of the term "Vulcanized rubber?"

A. Simply because I do not find the process of vulcanization referred to in any of his patents as I now recall them.

x Q. This opinion of yours, then, is a surmise, because you do not find that term "vulcanization" specifically mentioned in the patent, is it not?

A. In substance, yes, it is a surmise ; I suppose if he had meant to use vulcanized rubber, which process was well-known, he would have said so.

On page 136 of the record, Mr Brevoort is asked if vulcanized India rubber would not perform the same function as an unvulcanizable solution of rubber in the Tuck packing; and in answer, he says:

"I do not think I can answer that question, as I have never seen any packing that was not vulcanized, that was prepared merely with rubber cement ; I don't know how such a packing would work. I think that the vulcanized goods would be far better than the unvulcanized "

x Q This, then, is a matter of opinion with you more than of actual knowledge, is it not?

A. Yes, it is; I never remember having seen a piece of unvulcanized packing.

On page 141 of the Record, Mr. Brevoort further testifies as follows:

x Q Could not McBurney packing, as shown and described in his letters patent, be made by cementing the canvas layers together with India rubber solution or cement made in that way?

A. I think it could be; I think McBurney described that his packing might be made without vulcanization.

x Q. Could not Gately packing be made by cementing a piece of McBurney packing constructed of layers of canvas cemented together with India rubber solution to a strip of pure gum, and would not such a packing be capable of performing the function performed by the Gately packing as made?

A. Something could be made in the way suggested; whether it would wear or not I do not know; but I do know that it would not be Gately packing as made.

x Q. Why?

A. Because as I understand Gately, his packing is to be vulcanized.

x Q. Then do I understand you that the difference between Gately's packing and the packing such as I have described, lies solely in the vulcanization of the packing?

A. That is one of the differences, and also in the vulcanization of the backing. This vulcanization makes the packing a coherent, strong, solid whole, the rubber and the canvas being firmly united, so that they can be dealt with as a single article or a strip.

x Q. Would not a packing cemented together by India rubber solution, as I have described, be dealt with in the same way; would it not, in fact, be a concrete packing?

A. I doubt whether it would; I do not know because I have never tried it.

The fact that Tuck's packing has been vul[illegible]ized for many years back of the date of Gately's application for his patent is also shown by the witness Allen Magowan. (*See page* 22 *of the record*). Where he testifies as follows:

Q. You are a practical rubber manufacturer, are you not?

A. Yes, sir.

Q. How long have you been engaged in that business?

A. I suppose about 28 or 30 years.

Q. Are you familiar with the elastic backed packing which has been made under Tuck's patent; known as Tuck's Packing?

A. Well, I think so.

Q. Will you just describe that packing in general terms?

A. Well, the Tuck's patent? Well, the packing that we have made—that I saw made before the war, or during the war—is similar to the packing we have been making all along.

Q. Just describe it in general terms?

A. We first take the roll of duck and friction it, and pull it out on the table and cut it bias and roll it up—with a solid piece of gum on the inside and roll it up—then put that in the vulcanizer and vulcanize it.

He then goes on to state that he did such work at the shop of Bramhall & Sinclair, in Paterson, New Jersey, during the war. He explains the term "friction" as follows (*page* 23):

Q. When you say duck was frictioned what do you mean?

A. When it goes through the rolls just enough gum is wiped into this duck to make it stick and hold together, and then as we roll it up it sticks together.

Q. Did I understand that there is, in fact, a thin layer of gum between each two layers of duck?

A. Yes.

Q. Did you make that packing in any other form?

A. We made it square; just put one coat of duck, and put one layer on top of another until they get it the desired thickness; then it was cut into square strips; make it from one-quarter to two and one-half inches thick.

Q. This was done before the year 1865?

A. Yes, sir.

Q. That was known as Tuck's packing, was it not?

A. That is what I understand as Tuck's packing.

Q. Mr. Magowan, how was that duck cut bias; was it done before you rolled it?

A. Yes, sir.

Q. By the length of the duck?

A. In cutting it bias we pulled it out straight on the table and then cut it across diagonally; we turned the selvedge edges right around together.

Upon the showing of complainant's own witness, Brevoort, it is perfectly clear that Tuck's packi g as patented in 1854, was a vulcanized packing and was so understood in the art. Most assuredly it is shown to be a solid, concrete, vulcanized packing made in strips similar to the Gately packing and used in exactly the same way in the stuffing-box and with the same results.

Coming to the second point of difference urged by the expert witness of the complainant, let us see what the extent of that difference is.

Mr. Brevoort urges the objection to the Tuck patent of 1854 that it shows a packing which in use presents a varying, wearing surface to the rod, while Gately's packing at all times presents a similar wearing surface; that is, it's character does not change.

If the Court can see that this quality of the Tuck packing is due to a different principle in the construction, function or mode of operation in the Tuck and Gately packings, it will go further than complainant's expert witness has attempted to go. There is no question that when

in use, Tuck's packing of the form shown in section in figure 9 of the drawings of the 1852 patent, presents to the rod a wearing surface which varies slightly as it wears. First, a ply of fabric is worn off; then the thin film of vulcanized rubber between the plies is worn away; next another ply of fabric is worn away, and so on until the middle of the roll is reached, when all the plies of fabric in contact with the rod are vertical to it. In Gately's packing all the plies of fabric are vertical to the rod during the entire period of use. In spite of this difference, however, we find that for all practical purposes the two wearing parts of the respective packings are substantially similar, and they are held in their positions relative to the rod by similar cushions.

Concerning the effect of the two methods of preparing the wearing strips in the Tuck and Gately packings, Mr. Brevoort testifies as follows: (*See record, pages* 139 *and* 140).

x Q. Look upon figures 4 and 9, in Tuck's patent of 1854, and state whether or not, as wear progresses, layers of cloth would be presented vertically to the wearing surface?

A. Yes, some would; some parts of the packing would have layers at that angle to the backing of rubber; some parts of the packing would have canvas parallel to the backing of rubber.

x Q. Assuming a piece of packing, similar to that depicted in figures 4 and 9, to be worn one-third of the way down, or to be cut down before introduction into the stuffing-box, what would be the practical difference between the surface so presented to the rod and that presented by the Gately packing?

A. The Gately packing would present a uniform surface and the Tuck packing would present a surface which was not uniform and which was continually changing as wear progressed.

x Q. What is the difference in function between the canvas part of the Tuck packing so worn, as described in the previous question, and the canvas part of the Gately packing?

A. The difference is this: that the Tuck packing is always liable to have some of the layers of canvas which are parallel

with the rod rolled up by the action of the rod, making lumps and causing leakage, whereas with the Gately packing the edges of the canvas are always presented and a like wearing surface is always formed for the rod to bear against.

x Q. Is this answer based upon actual knowledge as to the qualities of the Tuck packing referred to as in use?

A. I have seen this happen to Tuck packing; I do not know how common it is.

x Q. Is it not a very uncommon thing?

A. I do not know; I have used more Gately packing than I have Tuck packing.

x Q. How much Tuck packing have you used?

A. I could not tell; we always used Tuck packing when I was in a machine shop in Brooklyn, around 1868, 1869 and 1870, and I suppose I have packed a great many engines with it there; most of them were comparatively small engines; some of them were large engines. I did not see the engines used to any extent afterward; we used Tuck's packing in the engine at the shop, I think, but I am not certain.

x Q. How many accidents of the kind spoken of can you remember in your experience?

A. I am sure I could not tell; they were not accidents; they were simply imperfections in the packing; but they were imperfections which I never heard of anybody's experiencing and never experienced myself with the Gately packing; Tuck's packing will pack a stuffing-box well, only Gately packing will pack it better.

x Q. Then the difference between the Tuck's packing of 1854, just spoken of, and the Gately packing is in the degree of their respective durability, is it not in, your judgment?

A. The difference resides in the fact that the Gately makes a better and more certain packing than does the Tuck. This is my observation of the matter, and I think it is a little more flexible and easier handled.

x Q. Then, in your judgment, the only difference between the two is in the degree of their flexibility and their durability?

A. Their efficiency and their flexibility; I do not think of any other distinguishing characteristic; the Gately is

better than the Tuck, as it always presents a like wearing surface to the rod.

x Q. Both the Tuck and the Gately packings are capable of making steam-tight joints, are they not?

A. They are.

x Q. And as a matter of fact is not the Tuck packing very largely used at this day?

A. It is.

x Q. And is a popular packing, is it not?

A. I should call it so.

From this testimony only one inference would seem fairly deducible, and that is that the Tuck packing of 1854, and the Gately packing, are substantially similar in their respective parts and in their functions; that they are both good packings, and that if the Gately packing has a slight advantage over the Tuck packing, it is due simply to the fact that all the laminæ of cloth composing its wearing strip are placed vertical to the rod, while in the Tuck packing they are made up in a roll. Most assuredly there is very little, if any, practical difference. Mr. Brevoort's efforts to show that Tuck's packing is defective in its wearing strip have utterly failed.

On page 82 of the record, defendant's expert witness, speaking of the differences of these packings when in use, testifies as follows:

Q. Is there, then, any material difference in the matter of wear and effect, and in the manner of presenting the flat surface or edges of the duck to wearing surfaces?

A. No very material difference, not in principle, because in the flexure of the packing where the flat surfaces occur in applying them to the rods by bending them into rings the compressing and the shortening of the inner circle of the fibre forces them into loops which are pressed closely together and present their edges to the moving rod, whilst the same effect nearly takes place when forced together more closely—that is, the threads in the cut edge of the packings. It is only when the piston rod is so rough as not to be properly serviceable that either of these packings will strip or cut out threads with the motion of the rod.

In view of what has been shown it is insisted that the Tuck patent of 1854 constitutes an anticipation of the Gately patent.

The state of the art can be very shortly reviewed. Much of it is shown in the patents already examined, and what remains to be considered is the testimony relative to the use of the extemporized packings exemplified in the lost exhibits " D " and " H."

The testimony concerning these exhibits is hereinbefore referred to, and it seems unnecessary to do more than state the sum of the proofs. The facts as conclusively proved are, that two of the witnesses—Wiegand and Harrison—and others, had more than once made and used packings for stuffing boxes constructed of pieces of hose with vulcanized rubber backings of precisely the same construction as the Gately packing, with the exception that the wearing strip and the rubber spring were united together by lamp-wick lashings. The proofs are clear that they were introduced into the stuffing-box with the rubber cushion placed next to the wall of the stuffing-box while the cut strips of hose bore edgewise against the rod; that the plies of duck of which the rubber hose was made were cut bias, and presented the ends of the threads forming the same to wear against the rod. That such use occurred in this country long before Gately pretends to have invented his packing.

There is no escape from the conclusiveness of the evidence. The facts are circumstantially stated; names, datee and places are given, and all efforts to break down the testimony of any of the witnesses only resulted in strengthening it.

Confronted by these facts, the complainant's expert witness attempts to meet them by the statement that Harrison and Weigand were not making the packings they described, but were trying to approximate Tuck's round packing, and were making a *wearing surface of lamp wick*, and used the strips of hose and belting which they had been to so much trouble to cut in a particular fashion, for the mere purpose of making out the elastic filling of the packing. (*See record, page* 116). This assumption of the expert witness is absolutely without foundation, as will be readily seen on an

examination of the testimony of the witnesses Wiegand and Harrison. The witness Brevoort further says (pages 116 and 117): "In the case of such packings no one can tell without actual inspection how the hose or belting would be exposed to the rod, for in the strain of packing the box and screwing down the gland the belting or hose, if unattached by vulcanization to the rubber backing, might twist or turn, and thus, instead of the ends of the threads being exposed to the wear, the sides or rubber surfaces would be exposed, and it would be a mere matter of conjecture as to how the packing would actually operate if it was used at all after the lamp-wick had been worn through its surface. It is clear that these old makeshifts, or, as Mr. Wiegand calls them, "expedients," did not show the Gately invention, for they did not show a rubber backing of pure gum, and a front-wearing portion united by vulcanization to the back or elastic gum portion, so that a homogeneous article was produced; but they did show something that Gately dispensed with, and which was common to the old packing, to wit, an elastic core and a wrapping of some textile or fibrous material around such core."

All of this argument—for it is nothing else—is totally disproved and discredited, first by the testimony of the witnesses Harrison and Weigand, who testified that they procured their wearing surface from the strips of hose and that they used the lamp-wick simply for lashings to hold the parts of the packing together; and secondly, by the deposition of complainant's witness, Frank C. Jones, found on pages 120, 121 and 122 of the record. This witness tried a practical experiment for certain reasons and testified to the result of that experiment. He testified that he took four rings composed of rubber belting cut on the bias, and vulcanized rubber cut in strips, and wrapped them around and tied them with lamp wicking to keep them together, that is, to hold the strips of vulcanized rubber back of the belting like defendant's exhibits "D" and "H," that he put them in the stuffing-box of an engine and screwed the gland down pretty tightly and ran the engine for ten hours; and that he then took the rings out and produced them before the examiner in the condi-

tion in which they were when they came from the stuffing box. These rings were filed in evidence and marked "Exhibit Jones No. 1." At the bottom of page 121 of the record is found the following testimony of the witness Jones.

Q. When the rings of "Exhibit Jones No. 1," composed of elastic rubber and belting, were taken out of the stuffing-box, what had become of the lamp-wick?

A. The lamp-wick was pretty well broken up, as is observed. Some of it will be observed sticking here, and in handling them they have all got broken apart; some of them still have it, it can be seen.

Here is a direct refutation of the witness Brevoort's theories. Complainant's own witness proves that extemporized packings made like those produced by Harrison and Wiegand kept their proper shape and position in the stuffing-box of an engine run at high pressure and with the gland of the stuffing-box tightly screwed down, and it also shows that the lamp-wick lashings which Mr. Brevoort says Harrison and Wiegand must have intended for a wearing surface had almost disappeared inside of ten hours.

It certainly would seem as if nothing further were needed to establish the very practical character of these improvised packings and their strong similarity to the Gately packing.

To recapitulate, we find that this review of the state of the art has established the following facts beyond controversy, viz:

First. That laminated bias cut woven packings were older than Gately's invention.

Second. That the use of the elastic rubber springs or backings with laminated bias cut cloth wearing strips in packings was older than Gately's alleged invention.

Third. That in making packings the art of cementing cloth laminæ together with India rubber and vulcanizing the packing was older than Gately's alleged invention.

Fourth. That in making packings the art of cementing together wearing strips of laminæ of cloth and an e astic strip or backing of India rubber and vulcanizing them in a concrete packing was well known long prior to Gately's alleged inventioion.

Fifth. That the effect or function of each element of Gately's packing was performed in the same way by similar elements of packings known and used in the art prior to Gately's alleged invention.

Sixth. That the functions performed by Gately's packing was performed in the same way by vulcanized packings possessing similar elements similarly disposed relatively to each other, known and used very extensively in this country before Gately's alleged invention; and that Gately's packing was flatly anticipated by Tuck's English letters patent No. 1865, of the year 1854.

Seventh. That there was nothing new in Gately's packing when viewed in the light of the pre-existing state of the art, but that simply as a manufacture, it appears at best, as presented, to have been made more neatly than some other forms of packing. That a slight difference in degree of mechanical skill in the making of it is the only feature apparent; its construction and operation being essentially similar to the construction and operation of earlier packings well known in the art. In short, that Gately merely substituted one old wearing strip for another almost precisely like it.

DIFFERENCE IN DEGREE.

The expert witnesses on both sides agree that the only difference between Gately's packing and Tuck's packing of 1854, is the difference in degree. (*See record, pages* 140 *and* 82).

It is so well settled that there is no invention in mere change of degree that it seems unnecessary to do more than cite on that point the cases of *Smith* vs. *Nichols*, 21 *Wall.* 112; and *Guidet* vs. *Brooklyn*, 105 *U. S.* 552.

PUBLIC USE.

Recognizing the weakness of its patent, complainant sought to bolster it up by proving that the manufactured article covered by it had gone largely into public use. There is no question that the packing has been largely used,

but it is insisted that the Court below erred both in finding as a fact that it had gone so largely into public use as almost to supersede the use of all other packings; and in deciding on that or any other ground that the patent disclosed invention.

The only testimony concerning the public use of the Gately and other packings upon which the Court based its finding is as follows. On page 98 of the record, the witness Gately testifies as follows:

Q. When this packing, described in and covered by your patent No. 86,296, was put upon the market, how did it turn out?

A. It proved to be very satisfactory; the sales immediately commenced to be large, and very soon we sold more than of the other kinds.

On page 102 of the Record the witness Ebenezer Roby testifies as follows:

Q. When the Gately packing, covered by patent No. 86,-296, was introduced upon the market, how did it turn out as an article of manufacture?

A. Immediately upon the introduction of this packing we began to receive orders for it from the engineers; we sent it to all our agents throughout the United States, and immediately large sales followed, so much so as to supersede in a large measure the sale of the McBurney packing and Tuck's round packing.

The witness also declares that the Gately packing was sold at a higher price than the McBurney or Tuck's round packing, and he further says that Tuck's round packing was at that time the only form of Tuck's packing in the market.

On page 140 of the Record, complainant's expert witness, Brevoort, testifies as follows:

x Q Both the Tuck and the Gately packings are capable of making steam-tight joints, are they not?

A They are.

x Q. And, as a matter of fact, is not the Tuck packing very largely used at this day?

A. It is.

x Q. And is a popular packing, is it not?

A. I should call it so.

Now it is submitted that this evidence does not show at all that the Gately packing almost entirely superseded all other forms of packing in the market. All it does show is that it sold largely, and suited many people better than the other packings, but the old Tuck packing still remained a much used, efficient and popular packing.

It is easily understood how a new packing which is admittedly a good one will succeed in the market when pushed by a manufacturing concern having ample capital and considerable commercial connections. The complainant owned the patent on the Gately packing, and naturally would seek to push the patented article on the market at the expense of Tuck's packing or any other packing in which it was not equally interested.

But it is submitted that as a matter of fact the sales of the patented article cannot be cited in favor of its patentability in this case. At best Gately but made a slight advance in the art by the exertion of mere mechanical skill; and this case is ruled by *Atlantic Works* vs. *Brady*, 107 *U. S.* 192; *Tack Co.* vs. *Mfg. Co*, 107 *Ib.* 117; *Penna. R. R. Co.* vs. *Truck Co.*, 110 *U. S.* 490; *Phillips* vs. *Detroit*, 111 *U. S.* 604; *Morris* vs. *McMillin*, 112 *U. S.* 244; *Hollister* vs. *Mfg. Co.*, 113 *U. S.* 59; *Thompson* vs. *Boisselier*, 114 *U. S.* 111; *Stephenson* vs. *Crosstown R. R. Co.*, *Ib.* 149; *Gardner* vs. *Herz*, 118 *U. S* 180; *Watson* vs. *R. R. Co.*, 132 *U. S.* 161; *Burt* vs. *Evory*, 133 *U. S.* 349, *and Hill* vs. *Wooster*, 10 *Sup. Ct. Reporter* 228.

So far as concerns the general public use of this packing of Gately's, the Court is referred particularly to the cases of *Hollister* vs. *Mfg. Co*, *supra.*, and *Gardner* vs. *Herz*, *supra.* In *Hollister* vs. *Mfg. Co.*, the Court admitted that the subject matter of the patent was new, and admitted that it clearly appeared that it was of the greatest utility and was very largely used, but said: "Such an increased utility, beyond what had been attained by devices previously in use, in cases of doubt, is usually regarded as determining the question of invention. But in the present case we are not able to give it such effect."

In *Gardner* vs. *Herz* it was insisted that the popularity

and success achieved by the patented article, beyond those of its predecessors, afforded cogent evidence both of the utility and patentable novelty of the article, but the Court said (referring to *Thompson* vs. *Boisselier*): "It is not enough that a thing shall be new, in the sense that, in the shape or form in which it is produced, it shall not have been before known, and that it shall be useful, but it must, under the Constitution and statute, amount to an invention or discovery." See, also, *Phillips* vs. *Detroit; Saxby* vs. *Gloucester Wagon Co.*, 7 *Q. B. Div.* 305, referred to in *Gardner* vs. *Herz* and *Hill* vs. *Wooster*.

The Circuit Court, in deciding the case of *Phillips* vs. *Detroit* (17 *O. G.* 191), makes the following clear and sound statement of the law:

"Great stress is laid in this case upon the superiority of this pavement over any other heretofore used, and it is claimed as almost, if not quite, decisive of the right of complainants to their patent. While the value and utility of a device, and the fact that it has superseded others frequently employed for analogous uses is undoubtedly entitled to weight in considering the question of patentability (*Smith* vs. *Goodyear Dent. Co.*, 93 *U. S.* 486), it is after all a somewhat uncertain criterion. If the device be in fact novel, it furnishes an additional reason why the inventor should receive the reward of his ingenuity, but if it involved no exercise of the inventive faculty, its very utility is an aggravation of the wrong done by the patentees in seizing and appropriating that which properly belongs to the public."

It is submitted, then, that the Gately patent in suit here is void: first, because its subject matter is anticipated by Tuck's English patent of 1854; second, because in view of the state of the art it discloses no invention on the part of the patentee, but merely shows a slight advance attributable solely to the exercise of mechanical skill; and that, consequently, the decree of the court below should be reversed.

Respectfully submitted,

F. C. LOWTHORP,

Of Counsel with Appellant.

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SUPREME COURT OF THE UNITED STATES

OCTOBER TERM, 1891.

No. 30.

ALLEN MAGOWAN et al.,
Appellants,

vs.

THE NEW YORK BELTING & PACKING COMPANY.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF NEW JERSEY.

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APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF NEW JERSEY.

BRIEF FOR APPELLEE.

Statement.

This is an appeal from a final decree in equity, made on the 28th day of September, 1887, in favor of the New York Belting and Packing Company, complainants, against Allen Magowan, Spencer M. Alpaugh and Frank A. Magowan, defendants, awarding to the complainants the sum of nine thousand and twenty-six $\frac{66}{100}$ dollars ($9,026.-66), profits in equity, together with the costs of suit,

taxed at seven hundred and forty-two and $\frac{5}{100}$ dollars ($742.05), making an aggregate of nine thousand seven hundred and sixty-eight and $\frac{71}{100}$ dollars ($9,768.71) (Pages 151,152).

The bill in this cause was filed on the 17th day of June, 1884, for infringement of Letters Patent, dated January, 26th, 1869, granted to the complainant, as assignee of Dennis C. Gately, for a new and useful "improved *vulcanized rubber packing*," and numbered 86,296. The application was filed January 7th, 1869, and the oath made December 31st, 1868. "Complainant's Exhibit Patented Packing" is a specimen of the thing patented.

The things complained of as infringements are vulcanized rubber packing, made by defendants, specimens of which are shown in "Complainant's Exhibit Trenton Rubber Works, 1882," and "Complainant's Exhibit Trenton Rubber Works, May 27th, 1884."

The packing, which is the subject-matter of this suit, is what is known as piston rod packing. In order to properly understand the properties and qualities, that are desired in such a packing, it is necessary to understand the exact nature of its use. The piston of a steam engine is a disc vibrating back and forth in the cylinder. At one end of the cylinder is a hole, through which the piston rod projects, and by its vibration backwards and forwards it communicates the power, caused by the steam pressure against the piston, to the machinery to be moved. In order to prevent leakage of steam between the wall of the hole in the cylinder head and the piston rod, there is placed at that end of the cylinder an apparatus called a stuffing-box, through which the piston rod plays. This stuffing-box forms part and parcel of the cylinder head and the passage through it is an enlarged continuation of the hole in the cylinder head through which the piston rod moves. The hole or aperture in the stuffing-box is of consider-

ably larger diameter than the piston rod, so as to admit of some yielding substance being used to fill up the vacancy, which substance is caused by pressure to fit so closely against the sides of the stuffing-box and the moving piston rod as to prevent any escape of steam. The stuffing-box is a very old contrivance and in former days hemp was the substance generally used as a packing. The end of the stuffing-box away from the cylinder has a sort of lid, the aperture of which is just sufficient to allow the free passage of the piston rod, and this lid is so shaped, that it can be screwed down upon the other parts of the stuffing-box and forced against the hemp or other packing in order to compress it. A good example of a stuffing-box is shown in the drawing figure 5, page 168, 289 *a*, where *d* represents the lid of the stuffing-box (known as a "gland" or "follower") with its screws, and *c c* represents the other parts of the stuffing-box, the piston rod also being plainly shown, and also the packing between the rod and the stuffing-box.

It will be readily seen, that the piston rod is rapidly moving back and forth, in contact with the packing, with practically irresistable force. If, therefore, a packing has been made possessing peculiar excellence of form, it must also possess great power of resistance to wear and stability of structure during the process of wearing and invariability in regard to the pressure exerted against the moving piston rod, in order to enable the best results to be secured. It is eminently desirable that, when the packing is packed into the stuffing-box around the piston rod in an exactly satisfactory manner, its nature should be such that it cannot be disturbed, and thrown out of position, or impaired by the force of the gland or follower, when it is screwed down, or, after the engine is set in motion, by the vast power of the back and forth movement of the piston rod wearing against it.

It had been the aim of engineers for a great many years past to meet all these trying conditions, and the general progress of the art is illustrated by the various exhibits, showing structures, that have been patented from time to time, prior to the date of the plaintiff's patent, for use in a stuffing-box.

The specification (pp. 153, 154) describes the invention as "certain new and useful improvements in *vulcanized India rubber packing.*"

The invention is an improvement upon packing of the kind for which Letters Patent were issued to Charles McBurney on June 28, 1859. Briefly stated, McBurney's invention consisted of a packing made of layers of canvas, united together by the interposition of layers of vulcanizable rubber compound, cut into strips diagonally in reference to the threads of the canvas, so that the wearing surface would consist of the ends of the threads. By cutting the packing diagonally it was made much more easy to bend (p. 177). McBurney also states that his packing need not be vulcanized (p. 178). The great defect of McBurney's packing was that it was not easily compressible.

Gately's specification, after referring to the McBurney patent, states as follows (p. 153):

"This packing, which is usually employed in the stuffing-boxes of pistons, is composed of plies of cloth or canvas, cut bias, coated with rubber and pressed together and vulcanized.

"When thus made, the packing is very solid, and possesses but little elastic property, so that as it wears there is some difficulty in maintaining a tight joint between it and the piston. To obviate this disadvantage is the object of my invention, which consists in forming the packing with a backing of pure vulcanized rubber, or rubber of sufficient elasticity for the purpose desired, which may be covered and protected by a strip of canvas or other suitable fabric.

"In the drawing, *a* represents the ordinary packing

band, which is backed by the rubber strip *b*, *the whole being vulcanized together so as to be solidly united;* and the rubber may be covered, if desired, by the canvas strip *c*, to protect it from injury.

"When the packing is placed in the stuffing-box and around the piston, and the follower is screwed down, so as to compress the packing, the rubber strip will also be compressed and forced against the sides of the stuffing-box, and, as it cannot expand in the direction of the follower, it acts as a spring to hold the packing against the piston rod, and to prevent leakage, compensating for any slight wear in the packing, and making a tight joint between the rod and the packing.

"It would be manifestly impracticable to impart this quality of elasticity to the body of the packing, or that part which is in contact with or bears against the rod, but by backing it with an elastic cushion, which, upon being compressed between the follower and the sides of the stuffing-box, acts as above described, the packing is possessed of *every qualification required for its successful use, and a tighter and better joint is made than has heretofore been practicable.*"

The claim of the patent is:

"The combination, with the packing, such as herein specified, of an elastic backing, or cushion of vulcanized India rubber, substantially as and for the purposes set forth."

"In the Gately packing, each layer of canvas is held to the rubber backing by a layer of rubber which is vulcanized, and which holds the canvas on each side of itself together, and which layer of vulcanized rubber extends back to and is vulcanized as a part of the rubber backing" (p. 138). "The whole is vulcanized in one homogeneous mass" (p. 13, Q. 5).

One end of each thread of the canvas bears against the rapidly moving piston rod, while the other end is embedded in and united to the vulcanized backing, the layers of canvas having rubber between them, which also forms one piece with the backing.

The thing patented was a strip of packing, which, although composed of two substances—canvas and rubber—was united by the process of vulcanization, so that all its parts formed a single solid and completely united strip of packing (p. 120).

The patent is for *a new article of manufacture*, which is well defined by Tyndal, C. J., in Cornish *vs.* Keene (1 Webster, P. C., 513). "*It is a vendible article produced by the art and hand of man.*" It is a peculiar structure, differing from that of any other pre-existing article.

In order to get a clearer understanding of the nature of the thing patented, it will be profitable to consider how a structure could be made, which would resemble in outward appearance the Gately packing, and yet would not come within the limitations of the patent. If it were attempted to make a packing by cementing a piece of McBurney packing, constructed of layers of canvas cemented together with India rubber solution to a strip of pure gum, it is possible that a packing could be made in the way suggested; whether it would stand the wear or not is problematical, but it is certain that it would not be Gately's patented packing. It would lack *the essential feature of being vulcanized in one mass*, and being thus *converted into an elastic, coherent, strong, solid whole.*

This point was clearly brought out by defendant's counsel upon the cross-examination of complainant's expert witness, Brevoort, as follows (p. 141):

x Q. Could not Gately packing be made by cementing a piece of McBurney packing, constructed of layers of canvas cemented together with India rubber solution, to a strip of pure gum, and would not such a packing be capable of performing the functions performed by the Gately packing as made?

A. Something could be made in the way suggested; whether it would wear or not I do not know; but I do know that it would not be Gately's packing.

x Q. Why?

A. Because, as I understand Gately, his packing is to be vulcanized.

x Q. Then do I understand you that the difference between Gately's packing and the packing such as I have described, lies solely in the vulcanization of the packing?

A. That is one of the differences, and also in the vulcanization of the backing. This vulcanization makes the packing a coherent, strong, solid whole, the rubber and the canvas being firmly united, so that they can be dealt with as a single article or strip."

The answer sets up several defenses. Those relied upon are sufficiently specified in the opinion of the Court below.

The cause was brought to final hearing on the pleadings and proofs on July 6th, 1885.

On February 18th, 1886, a decision was filed in favor of the complainant, which is as follows (pp. 144–146) 27 F. R., 362:

"By NIXON, D. J.:

Letters Patent No. 86,296, for 'improved vulcanized-rubber packing,' were granted to the complainant corporation, as assignee of Dennis C. Gately, on January 26, 1869, and this suit is brought to recover profits and damages for their infringement.

The answer of the defendants—

1. Denies infringement;

2. Alleges that Gately was not the original and first inventor of the thing patented; and

3. Claims that the Letters Patent are void (*a*) because the single claim is too broad, covering more than Gately invented; (*b*) because the specifications fail to sufficiently distinguish between what was novel and what was old in the art; (*c*) because, in view of the state of the art at the date of the issue of the patent, no invention is exhibited and shown.

The defence of non-infringement was not well taken, not being sustained by the evidence. The packing manufactured by the defendants in 1882 and 1884 were exhibited. The first was an exact counterpart of the complainant's product under its patent, and the second was *a feeble*

attempt at evasion by having only the central part of the inner surface of the canvas, next to the piston rod, cut bias.

The other defences, which may be fairly grouped under the single allegation of want of patentability of the invention in view of the state of the art, have caused more difficulty and required more careful examination.

In the specifications of the patent the inventor states that his invention relates to packing of the kind for which Letters Patent were issued to Charles McBurney on June 28, 1859; that the defect of the McBurney invention was that the packing was not sufficiently elastic to maintain a tight joint between it and the piston, and that he has secured this greater elasticity by 'forming the packing with a backing of pure vulcanized rubber, which may be covered and protected by a strip of canvas or other suitable fabric.' He claims that when a packing thus formed is placed in the stuffing-box and around the piston, and the follower is screwed down so as to compress the packing, the rubber strip will also be compressed and forced against the sides of the stuffing-box, and as it cannot expand in the direction of the follower it acts as a spring to hold the packing against the piston rod and to prevent leakage, compensating for any slight wear in the packing and making a tight joint between the rod and the packing.

The claim of the patent is

'The combination, with the packing such as herein specified, of an elastic backing or cushion of vulcanized India rubber, substantially as and for the purposes set forth.'

It is quite clear from these specifications that the patentee conceived that he had remedied the defects and made an improvement upon the then existing McBurney patent. Turning to that patent we find that it was granted on June 29, 1859, for an 'improvement in packing for stuffing-boxes of pistons.' It was claimed by the inventor to be a durable substitute for the hempen packing before employed in stuffing-boxes, more easily adjusted to produce a uniform pressure upon all sides of the piston rod; but in practical use it fell short of accomplishing what the patentee claimed for it.

Frequent complaints came from the purchasers to the manufacturers that it was too stiff and rigid and was not

compressible enough to make a tight joint in the stuffing-box. Gately, the patentee, who was the superintendent of the complainant corporation, set himself to the task of overcoming the defects. He made several experiments, and the result was the patent on which the suit is brought. He added to the McBurney packing the elastic backing or cushion of vulcanized India rubber, which not only rendered the *whole more compact and more elastic*, but, being compressed between the follower and the sides of the stuffing-box, acted as a spring to hold the packing continuously against the piston rod, *thus making a tight joint* which had not been attained under the McBurney invention and was not shown to have been so well accomplished under any other patent.

Whether a thing devised is due to the genius of an inventor or to the mechanical skill of a workman is often a difficult question to determine. The line between them is not always clearly drawn. Invention indicates genius and the production of a new idea. Mechanical skill is applied to an old idea and suggests how it may be modified and made more practical, and according to Smith *vs.* Nichols, 21 Wall, 112, such mere modification is not patentable unless some new and useful result is secured.

The complainant's patent is nearly on the line dividing invention from mechanical skill. *But after carefully comparing it with the exhibits which are put in to show anticipation and its lack of patentability, I am of the opinion* that the combination reveals invention, not so much because the packing is more elastic by reason of the addition of pure hard rubber, but because the patent discloses a *new and better method* of obtaining a tight joint between the packing and the piston rod than has been obtained by any other combination of elements, new or old.

It is a fact not to be overlooked, and has much weight, that the product manufactured under it went at once into such extensive public use as almost to supersede all packing made under other methods.

Such a fact is pregnant evidence of its novelty, value, and usefulness, and accounts for the defendant's infringement. Let a decree be entered in favor of the complainant, and for an account."

The conclusions arrived at by the Court were amply sustained by the evidence. So far as infringement is concerned, the proofs show a bald and shameless attempt to copy the plaintiff's goods.

The learned Judge, however, by no means stated all the facts supporting the patent, as we shall hereafter see; for instance, he might have added that the patented packing, when it so largely displaced the older rubber packing, was put upon the market at a *price from fifteen to twenty per cent. higher* than the older packings, although it *cost ten per cent. less to produce it* (p. 102).

So far as patentability and novelty are concerned, we have now not only the evidence then before the Court, but also the further evidence taken before the Master upon the accounting as to profits, which justifies and corroborates the decision of the Circuit Court in a most remarkable manner. It then appeared by the evidence of the defendants, themselves that they had realized a profit of $9,026.66 upon packing, which cost but $8,497.43, (more than 107½ per cent.), after allowing as cost every possible element such as expenses of manufacture, of making sales, clerk hire, etc., etc. (pp. 149–151).

During the early part of the infringing manufacture, the profit realized ran as high as 123⅜ per cent. on such cost price, while during the latter part of such infringement, it was reduced to an average of 89 8/10 per cent. In other words, *so great was the merit of this new article of manufacture that an infringer, laboring under the usual disadvantages of that position, could put it on the market, and for every* $10,000 *of out-go,* $20,750 *would come back to him.*

Brief of the Argument.

No attempt has been made to meet the plaintiff's proof upon the question of infringement. It is obvious on inspection, not only that "Complainant's Exhibit Trenton Rubber Works, 1882," is a specimen of what is described and claimed in the patent, without the slightest variation, but that "Complainant's Exhibit Trenton Rubber Works, May 27, 1884," is likewise a copy of what is described in the complainant's patent, except in regard to the strip in the centre of the specimen marked XX. The Court below properly described this as "*a feeble attempt at evasion.*" Infringement is substantially admitted by the defendant's expert (p. 79). We refer the Court to the parts of the proof relating to the question of infringement (pp. 10–21, 79), and particularly to the evidence of Brevoort (p. 119), where the question is considered, upon the assumption of the prior existence of all the structures and packings, spoken of in any part of the evidence for the defense as being in existence prior to the date of Gately's invention.

The only questions left in the case are in respect to patentable novelty in view of the state of the art.

The defendants, who were experienced rubber manufacturers, were evidently conscious of the novelty and utility of the patented packing, for, after copying it exactly in 1882, they later on made the alteration which the Court characterizes as "a feeble attempt at evasion." The change, moreover, was detrimental to the goods (pp. 14, 119). The defendants themselves have not undertaken to say anything impugning the merit of the patented invention, although one of them was a witness for the defence (p. 22).

State of the Art.

The state of the art is shown by certain pre-existing patents and structures which we will proceed to describe in chronological order. They are as follows:

1. Tuck's English Patent, 1852, No. 384 (p. 162).
2. Tuck's English Patent, 1854, No. 1865 (p. 156).
3. Tuck's U. S. Patent, 1855, No. 13145 (p. 159).
4. McBurney's U. S. Patent, 1859, No. 24569 (p 176).
5. A packing proved to have existed prior to 1865 by the defendant Allen Magowan, a specimen of which is marked "Complainant's Exhibit Tuck Packing" (pp. 22, 23). This packing, as will be abundantly shown, is a very different article from the Tuck packing described in the several patents to Tuck above referred to. In one aspect of the case, this may prove to be a very important fact to bear in mind.
6. Keirby's English Patent, 1865, No. 19 (p. 168).
7. Wise's English Prov. Spec., 1865, No. 647 (p. 173).
8. Keirby's English Patent, 1866, No. 2064 (p. 171).
9. McLean's U. S. Patent, 1867, No. 63071 (p. 174).

"Fibrous packing," composed of hemp or other fibre ground up with rubber and then vulcanized, and "pure strips" of vulcanized rubber, without fibre, to be used with a wrapping of lamp wick, came into use a few years after 1844, which is the date when vulcanized rubber was invented (p. 99). These two packings have no bearing upon the case.

The patents of Keirby and Wise are not set up in the answer. Nor is the prior knowledge of Allen Magowan alleged therein. The objection was duly taken (p. 22).

1. The packing described in the 1852 Tuck English patent, in no way resembles the plaintiff's packing. Tuck makes the elastic part of his packing out of "rolls or folds of canvas coated with India rubber," and the rest

of the packing is formed of hard substances, such as wood or metal (P. 163). Sheets or bands of canvas " have between them strips of caoutchouc or other elastic material, for the purpose of giving elasticity to the packing " (p. 166). There is no suggestion of the use of vulcanized rubber or of vulcanization, in any form, much less of vulcanizing the packing itself as a whole. Mr. Brevoort's evidence effectually disposes of Tuck's English patent of 1852 as we will hereafter show.

2. The packings, described in the 1854 Tuck English patent, were those most relied upon by the defense, but it will be very evident upon a careful examination of the specification of that patent, that the things described therein in no way resemble the plaintiff's patented packing. There is no suggestion in any part of this Tuck's patent of the process of vulcanization, or of the use of vulcanized rubber, or of uniting the various parts, of which the packing is composed, by the process of vulcanization. Tuck shows the use of a " block or core of India rubber or other suitable elastic material, *surrounded or covered by folds* of flexible material or fabric " (p. 157). He prefers to use " canvas coated or saturated with a solution of India rubber or other suitable composition " (p. 157).

The most favorable view for the defendants, that can be taken of this Tuck patent of 1854, is that the packing was composed of a ready-made piece of vulcanized India rubber, around which a sheet of canvas, coated or saturated with a solution of India rubber or other suitable composition, was wound. There is no suggestion, that the rubber solution, with which the canvas was coated, was vulcanized or vulcanizable. There is not the slightest suggestion in any part of Tuck's specification that the packing itself, including the rubber core and the layers of canvass, were to be vulcanized together, so as to form the final pro-

duct, and unless this was the case the reference is utterly valueless. Mr. Brevoort's evidence effectually disposes of Tuck's English patent of 1854, as we will hereafter show.

3. In 1855 Tuck also patented the packing of his English patent of 1854 in the United States (p. 159). It is a significant fact, that he omits from his American specification the packing, shown in figures 4, 5 and 9 of the English patent of 1854, which were the references principally relied upon by the defendants in the Court below. Tuck's American patent describes the packing as made of "India rubber and canvas saturated with India rubber or other suitable material or composition." He takes a fillet of canvas of the required length, so saturated, and he says: "I then roll it up into a roll and *allow it to cement* in a firm but elastic or flexible roll of any suitable diameter required" (p. 160). He proposes to "roll the canvas round a core or centre piece of India rubber or other suitable elastic material" (p. 161). He speaks of the canvas as "saturated canvas," and describes it as "rolled into form either in connection with the India rubber core or other elastic material or without" (p. 162). It is very evident that Tuck's American patent is no more relevant to the present case than Tuck's English patent of 1854. It can be said of Tuck's American patent, as of his English patent, that the utmost that can be claimed for it is, that it suggested the idea of taking a piece of *already vulcanized* rubber, and winding round it a piece of canvas or cloth coated with a cement, made of a solution of rubber, the cloth being wound together, and then *allowed to cement* (p. 160), there being *no suggestion whatever* of vulcanizing the cemented cloth or of vulcanizing the whole mass together so as to form one solid elastic strip, and that without this the reference has no bearing upon the plaintiff's invention. But we wholly deny that any of Tuck's patents

contains any reference to vulcanization or to any vulcanized product. Mr. Brevoort effectually disposes of the three Tuck patents, as follows (pp. 114, 115):

"This disposes of all the patents referred to, except the three patents of Tuck. These I will refer to in the order of their dates.

"The 1852 TUCK patent describes canvas coated with rubber, unvulcanized, which canvas was to be rolled upon itself and used in a stuffing-box in connection with rigid wearing surfaces, the object of the canvas being to force such surfaces into contact with the moving rod, or at least such was the principal office which the canvas was expected to perform. This patent, of course, does not show any one single feature of the Gately invention.

"The English patent of TUCK for the year 1854, shows nine forms of packing, none of which are vulcanized. All the forms practically consist of a rubber core and canvas rolled around such core. In some cases the core is located centrally; in some cases it is located at one side of the roll; but in all cases the canvas is rolled upon itself, or upon the core, and when the packing is in use and is subjected to wear, the character of the surface of the packing presented to the moving surface of the piston rod is *continually changing, part of the time a rubber surface being presented, and part of the time a canvas surface being presented.*

"The American patent of TUCK for the year 1855, shows five different forms of packing which are in substance copies of five of the examples shown in the English patent of the year before. There is no vulcanization referred to in the patent, and the wearing surface is composed of canvas cut on the bias, *but rolled around* the elastic or rubber portion, which itself is saturated with rubber. The rubber core is not insisted upon as a necessity, but the patent says that it is used at times for the purpose of giving greater elasticity to the packing. The three Tuck patents all showed packing which was *different in principle* from the packing described in the Gately patent in suit, differing principally in that the *wearing portion was of such a character that it was continually changing in*

its conditions during the wear of the packing, not, as in the Gately invention, presenting continuously a surface to the rod having like characteristics. It is a feature of the Gately invention that the wearing portion of the packing is not formed by rolling canvas either upon itself or upon a rubber core, but is formed by layers of canvas secured to themselves and to the rubber back by vulcanization. In fact, the Gately packing could not be made were it impossible to vulcanize rubber, whereas all of the Tuck patents are capable of being made independent of vulcanization, their structure being such that the canvas is used as a binding or cementing means, in connection with any adhesive compound to keep the packing together and to form the strips, whereas, in the Gately packing, the parts are kept together and in place purely and solely by reason of the fact that the rubber which enters into the composition of the packing has been subjected to the process of vulcanization, thus making the packing *a homogeneous whole*, by reason of such fact, not a strip rolled up upon itself, and thus by such rolling kept together and made to retain its shape, form and characteristics. It is perfectly clear, I think, that none of the patents referred to in the question show the Gately invention."

We may remark that it is probable that Tuck so studiously avoided all reference to vulcanization in his patents, because his packing, if made by the aid of vulcanization, would have infringed the patents then covering that process. These patents expired in 1865 (p. 96).

It is absolutely certain that we are not mistaken in our assertion, that the rubber or other cementing solution used by Tuck was not a vulcanizable compound, which was vulcanized, but a mere cement used to stick the sheets of cloth together. For, in his latest specification (1855, p. 160), speaking of the fillet of cloth, he says, I "then roll it up into a roll and *allow it to cement*." *These words absolutely exclude the idea of vulcanization.*

It is perhaps hardly necessary to remark that while cutting the cloth bias is mentioned by Tuck, such bias cutting

has obviously no relation or similarity to the bias cutting spoken of in the Gately patent.

4. The next step in the art is shown in McBurney's U. S. patent, 1859, No. 24569 (p. 176). This patent has already been referred to. It is the patent covering the packing, upon which Gately, *ten years afterwards*, made the improvement, which is the subject of the patent in suit. Vulcanization does not form an essential part of the McBurney invention, for he says (p. 178): "Even the vulcanizing process may be dispensed with, and I do not therefore restrict myself thereto, but what I claim as my invention and desire to secure by Letters Patent, is a packing for stuffing-boxes composed of canvas and India rubber as set forth, and cut diagonally as described."

5. The next step in the progress of the art is shown in the specimen marked "Complainant's Exhibit Tuck Packing." It is made of a piece of vulcanizable rubber on the inside, surrounded by a roll of duck coated with vulcanizable compound, the duck or canvas being rolled around the central core of rubber (pp. 22, 23). It is vulcanized. This exhibit represents, what came to be known as Tuck packing in the United States as early as 1865. It is obvious that this commercial vulcanized Tuck's packing has no bearing whatever upon the plaintiff's invention, as we will hereafter show (see pp. 115, 116). This American Tuck's packing of commerce also differs essentially from the several kinds of Tuck's packing, described in the three patents to Tuck already referred to, for none of the patents exhibit a product, created by vulcanization. Of course, this commercial Tuck's packing, notwithstanding vulcanization, is an infringement of Tuck's U. S. patent of 1855, and hence, probably, came to be known in the market in this country by his name.

6. The next step in the progress of the art is shown in Wise's Provisional Specification, March 8, 1865 (p. 173). *This publication is not set up in the answer, nor is the date of publication proved.*

The specification of Wise shows a packing, consisting of a body or cord, composed of canvas or other textile fabric or fibrous material, round which is woven, interlaced or braided, a fabric composed of fine wires. The packing thus formed is applied to stuffing-boxes in the usual manner, and presents a durable metallic surface, capable of yielding, when the packing is compressed. The packing consists of three parts, the central core of rubber marked *a*, outside of which is a part composed of canvas wound round the core, *b*, outside of which are interlaced or woven wires *e* and *e'* which constitute a compact metallic covering or fabric of wires.

7. The next step in the progress of the art is shown in Keirby's English patent 1865, No. 19, the complete specification of which was filed June 29, 1865 (page 168). Keirby shows a packing in the form of a flat rope or web, composed of two or more strands or plaits of hemp or other fibrous substances, united together in a loom or other suitable machine by a binding weft. The specification describes a web, composed of four plaited strands, and each plait or strand contains by preference an elastic core of vulcanized India rubber or other suitable elastic material. This partially formed strand is covered with yarns of flax or other fibres in another braiding machine, and then saturated with a lubricating compound, composed of soda ash, oil or tallow, lead ore and soap. These strands are united by a binding weft in a loom. The packing thus formed is introduced into the stuffing-box in the usual way.

8. The next step in the progress of the art is shown in Keirby's English patent 1866, No. 2064, the complete specification of which was filed February 11th, 1867 (page 171). This patent describes a packing, composed of a central metallic wire marked *a*, round which rubber or other elastic material is braided in long filaments or strands, or twisted, if obtained in strips or ribbons. Hemp or other fibrous material is placed over a cover of India rubber and wire, is saturated with red lead and, when so saturated, is knitted over the core by an ordinary knitting machine. The essential feature of the invention seems to be the combining together of India rubber or other flexible substance with wire or hemp or other suitable fibrous material for the production of packing.

9. The next step in the progress of the art is shown in McLean's U. S. Patent, 1867, No. 63071 (page 174).

This patent describes a packing composed of an outer layer of India rubber and an inner layer of cork, secured together by zinc or leaden strips bound round the same.

The Wise patent and the two Keirby patents are not set up in the answer and they together with the McLean patent obviously have no bearing whatever upon this controversy, except as tending to show, in common with all the other patents and structures that preceded, that what Gately accomplished where others failed, involved invention. If this statement needs any further demonstration, it can be found in the evidence of Mr. Brevoort (pp. 112, 113 and 114).

Alleged Prior Structures.

The evidence thus far bearing upon the state of the art is documentary or undisputed. There were however some other structures sought to be proved by the defendants and illustrated by defendants' exhibits A, B, C, D, E, F, G

and H, and also certain mutilations of Tuck's packing said to have been used as early as 1865. *These structures were at best mere make-shifts.* They are sought to be proved by the evidence of one Wiegand, the retained expert for the defendants, which is supposed to be corroborated by the witnesses Harrison, Smith and Lever.

A mere examination of defendants' Exhibit D and defendants' Exhibit H, and the rest of the lettered exhibits, all of which were designed to show the parts of which D and H were composed, will show conclusively that they have no bearing whatever upon the invention patented to the complainant. But if there be any doubt upon this point, it is set at rest by the evidence of Mr. Brevoort, pp. 116–118. We do not consider these exhibits of sufficient importance to justify the quotation of Mr. Brevoort's evidence here.

The evidence in relation to the mutilated Tuck's packing said to have been cut down from packing resembling what is shown in Tuck's English patent of 1854, and particularly figures 4 and 9, is found in the depositions of Wiegand, the defendants' expert, and two other witnesses.

Harrison, the first witness, claims to have used it on a Venezuela steamer in 1874. This use was foreign and too late.

Smith, the second witness, can swear to nothing definite upon the subject.

Wiegand can give no exact dates, and he admits that the only specimens of such packing he ever saw were samples on exhibition at some uncertain time at the Franklin Institute, Philadelphia, and at the Philadelphia Navy Yard, exhibited as curiosities. He shows no personal knowledge of cutting such packing.

This testimony is reviewed in detail below.

It is quite significant that extensive search and efforts

to find samples of the Tuck 1854 English packing, such as is shown in figures 4 and 9, resulted in the few and doubtful instances testified to. The expert Wiegand was working up evidence in this direction for months (pp. 84–85).

These facts alone would show conclusively that packing like that of figures 4 and 9 of the Tuck 1854 patent was impracticable, and that besides the differences between those structures and that of the plaintiff's patent specially referred to elsewhere, there was the radical difference between an useless article and one notoriously of the highest utility in its sphere.

If the make-shifts, described by Wiegand and the other witnesses, form any part of the state of the art, the chronological order in which they come in relation to the pre-existing things already considered, would be between the McBurney patent of 1859 and "Complainant's Exhibit Tuck's Packing," being the specimen testified to by Allen Magowan, the existence of which as early as 1865 is not disputed.

If, however, the Court considers these make-shifts of any importance in themselves, then our contention is, that, *as matter of fact, their existence is not proved.*

Review of Evidence as to Existence of the Alleged Prior Structures.

There were four witnesses produced by the defendants upon this subject, including S. Lloyd Wiegand, the expert retained by them. We will proceed to analyze the testimony of each, and will premise by saying, that with the exception of some of the mingled statements of fact and opinion made by Wiegand, the evidence is not even of any apparent importance in the case.

No notice of this evidence was given in the answer, and the objection was duly taken as to each witness, and is insisted upon.

WILLIAM F. HARRISON (p. 23) was an assistant engineer in the Confederate navy during a part of the late civil war, and testifies as to certain packings used on certain Confederate vessels. If his testimony had been pertinent and distinct, so as to make it of importance in the case, an interesting question might arise as to whether the use within the Confederate States, or upon any of their naval vessels in the waters under their control, during the war, was such a use within the United States, as would defeat the exclusive right under a patent of the United States, taken after the close of the war, by a citizen resident in Connecticut, in view of the doctrine laid down by the Supreme Court in the *Prize Cases*, 2 Black, 665, and the subsequent cases in which similar questions are discussed. (*The Circassian*, 2 Wall., 148; *The Venice*, 2 Wall., 274; *Mrs. Alexander's Cotton*, 2 Wall., 419; *The Peterhoff*, 5 Wall., 60; *Coppell* vs. *Hall*, 7 Wall., 554; *Miller* vs. *The United States*, 11 Wall., 305; *New Orleans* vs. *The Steamship Co.*, 20 Wall., 395; *Mitchell* vs. *The United States*, 21 Wall., 351; *United States* vs. *Farragut*, 22 Wall., 423; *Matthews* vs. *McStea*, 91 U. S., 9; *Williams* vs. *Bruffy*, 96 U. S., 184; *Ford* vs. *Surget*, 97 U. S., 604).

The substance of Harrison's testimony is as follows: That he was in the Confederate Navy in 1864, on certain vessels. He says in respect to his use of packing (p. 24):

"We used *whatever we could get hold of*. The supplies were *very deficient*, and we used hemp, gum hose, lamp-wick, and *anything that we could get* that would answer the purpose."

He says (p. 24): "It was generally old hose that we used, such as was of no service anywhere else. Sometimes we crushed it in that shape," referring to Defendant's Exhibit A, that is to say, it was flattened and forced into the box. "Again we cut it into strips lengthwise of the hose and bent it around the rod and forced it in." "Sometimes we would put pure rubber on the back, wrapping the two together with lamp-wick while getting them into the box." The strips of hose resembled Defendants' Exhibit B.

"Q. In what way does it resemble it?

"A. It is like any other hose cut that ever I saw, or took particular notice of" (p. 25).

Defendants' Exhibit C, a piece of plain gum, was also shown to the witness, and he took portions of Exhibits B and C, and tied them together with lampwick so as to form what is now Exhibit D (p. 25). He also speaks of Tuck's packing (p. 27), and is asked:

"Q. Can you give us a general description of that packing?

"A. I can tell you better by seeing it, or a sample of it, or cut of it.

"It is canvas and gum wound. I have seen various shapes to it—some of it is square, but it has sometimes a gum core with canvas wound around, layers of gum and canvas alternately."

He states:

"When it has a core it is in the centre, but there is a Tuck packing *I believe*, made with a piece of gum near one edge of it, or back of it, and then a layer of canvas and gum alternately over that wound together."

He is then shown the drawing of Tuck's English patent of 1854, and he states that he has used packings like figures numbered 4 and 9 in the drawings of said patent, and that sometimes, when the sizes were not right, he would

split off a portion of the fibre side of the packing. Sometimes he cut it down more than half way, so that the edges of the layers of duck would be presented to the wearing surface. This use of Tuck's packing it appears, however, was as late as 1874, and on a Venezuelan steamer running from the Island of Trinidad to Bolivar, Venezuela (pp. 27–29). On his cross-examination, it is found that he is utterly unable to tell any of the exact times and places, when he cut up any hose to use as packing in the manner described. He says also, it was a case of necessity, because they could get no better supplies (p. 34).

He is also asked (p. 34):

"Q. Did you ever examine at that time the construction of the cloth of which the hose was composed, so as to tell the exact manner in which the fibres ran. Did you find it out at that time?

"A. I never paid any particular attention to it. I only know that it worked better one way than it did another.

"Q. Did you pay any attention to the manner in which the hose itself was constructed at that time?

"A. No, sir; not at all, except so far as I knew the way the layers of the hose were, but as to the manner in which it was constructed I paid no attention. I knew how the layers of the hose ran when I cut it.

"Q. How much do you know about the way the layers ran?

"A. All that I saw.

"Q. Do you undertake to say positively at this distance of time, that that hose was composed of layers of duck that were cut bias in the formation of the hose?

"A. Oh, no, I would not say that, because I had to strip the hose to find out. I only know that it would show the ends of the thread. *I don't know whether it was bias or not*; I won't pretend to say."

William W. Smith, the next witness, was an assistant engineer in the United States Navy from the Fall of 1863 to the close of the war in May, 1865. He was asked:

"Q. What packing did you use?

"A. Used mostly Tuck's packing when we had it handy and convenient, if not, we used *other expedients* that we could get hold of.

"Q. What was this Tuck's packing, that you speak of, like?

"A. It was composed of gum and canvas.

"Q. How arranged?

"A. *I think* the gum was in the centre and the canvas wrapped around it, or woven around it. I am *not sure* which.

"Q. Was there any other rubber in it besides the strips of gum you speak of?

"A. *Not that I remember of*" (p. 37).

On being shown the drawing of Tuck's English Paten of 1854, he states in substance that he *thinks* he has used packing like figures 1, 2, 7 and 9, shown in that drawing (p. 38), and that "No. 9 had a rubber backing to it, to the *best of my recollection*," and that sometimes, when the packing was too large, he cut off a portion of the canvas side of the packing so as to get it in the stuffing-box. He also testifies as to cutting rubber hose up in strips and using such strips as a packing. Admitting all that he says, however, upon this topic, the most that could be claimed would be that what he made was a rough imitation of the packing patented to McBurney, for he says he used these strips (p. 40), "without anything else, alternate layers of the hose and hemp."

The cutting down of Tuck's packing was not done for the purpose of improving it, but only in case he did not have a piece that would answer the purpose without cutting (p. 41).

As a final result of this cross-examination, it will be seen that he *cannot testify positively in regard to anything*. The point in his testimony, that the greatest stress was laid upon, was that he had adopted this forced expe-

dient of cutting down Tuck's packing of the form shown in the drawing of the English patent of 1854, figure 9, on board certain vessels of the United States Navy, during the war of the rebellion.

He says (p. 45):

"Q. Then you are not willing to say positively that such packing as represented by figures 7 and 9 were used in the United States Navy in the years 1863, 1864 and 1865, or any of those years; is that not true?

"*I would not say positively*, but to the best of my recollection, we did have it."

He adds:

"*I have not thought about this subject at all*, nor even posted myself at all, nor referred to any old papers that I have; I came here quite unexpectedly to-day."

On his redirect he is asked to draw a line upon figure 9, and to show how far he cut such packing down. He draws such a line, marked XX., stating, "All I can do will be to approximate as near as my recollection will permit." He states that when he used the strips of hose it was merely "*because we could not do better; we were out of Tuck's packing*, and used it as a substitute" (p. 45).

JAMES S. LEVER (p. 47) was also examined as a witness. His testimony is of no importance whatever. He claims to have cut off a piece of old two-ply garden hose and used it as a packing. A strong effort is evidently made to get him to say that he used a strip of elastic rubber in combination with this piece of garden hose, and a piece of gum marked "Exhibit F," is shown him in the course of that effort; but all that he is willing to say is that he used such pieces of elastic or pure rubber in connection with lamp-wick, with which he wrapped the piston-rod first, the lamp-wick being next to the rod and the gum outside in the stuffing-box. He states distinctly (p. 52) that he

he does not think that he ever used anything else but lamp-wick in conection with strips of gum.

S. LLOYD WIEGAND (p. 59) is the last witness on the part of the defendant. By some mistake the cross-questions put to him are not marked as such. They extend from p. 83 to p. 97. He is their expert, regularly retained (p. 84).

According to general experience, experts are retained in patent causes to furnish opinions in respect to mechanical matters, but the present witness goes further, and furnishes in reality all the material facts in the case, that tend to aid the defendants. The other witnesses seem to have been merely called for the purpose of giving a semblance of corroboration to the bold statements made by the present witness, which, however, they signally fail to do.

Without wishing to assert that this witness has wilfully perverted the facts, we submit, that an examination of his evidence will show clearly, that what he says is entitled to very little weight. His whole testimony throughout exhibits a tendency to magnify and exaggerate everything; as, for instance, in the course of his cross-examination he speaks of his business career as a manufacturer from 1858, when he became of age, down to 1868, when he went out of business. In order to give an impression of his importance, he states, when asked whether he furnished the capital:

"A. I earned most of the capital as I went along; I had $80,000 in the business at last, and I began with less than $500" (p. 86).

But, after a few questions (p. 87), this $80,000 melts into thin air, and it is shown that he was insolvent, when he went out of business and he went through bankruptcy. So, too, throughout his examination in reference to various kinds of packing that were used, he speaks of them habitually in such phrases as these: "It was a *common expe-*

dient among engineers"; "Something *commonly used*"; "*in general use*"; etc., while the efforts to bring him down to some time, place and circumstance are in nearly all cases unsuccessful. We cannot recall a single patent case, in which the presumption of validity, that the law attaches to the patent, has been allowed to be overthrown upon any such testimony, and the fact that it is given by the expert retained for the defendants, and that the attempts to corroborate his statements by other witnesses have substantially failed, ought to leave all that he says practically out of the case. We will, however, review his evidence.

He speaks (p. 60) of the use of pieces of rubber belting forming part of the state of the art of packing stuffing-boxes in 1858 and 1859 and onwards, and he says:

"I have used both strips of rubber belting and strips of hose, consisting of layers of cloth cemented together by India rubber as early as 1859, and have off and on used it ever since, *when I had no other more convenient packing material.*"

This use was in Philadelphia. Anticipating the point, that would naturally occur to any one's mind, as to how it could be possible, that this use could take place in a large city like Philadelphia, where stores having the best qualities of rubber packing on sale, were to be found from the earliest introduction of vulcanized rubber packings, he immediately adds after the statement above quoted (p. 60):

"There was not at that time such an assortment of sizes of packings in the market as at present."

This statement differed from most of the statements, contained in the testimony of this witness, in that it presented something tangible, that it was possible for the complainants to meet, and they were able to contradict it. Roby shows (pp. 100, 101) that in 1858 and 1859, there was as large an assortment of sizes of rubber packing in the market as there is at the present day, and that rubber packing of

all sizes could have been purchased then as now in Philadelphia, at the store owned by the complainant at No. 308 Chestnut Street, in that city, which store was known to the witness Wiegand; and it further appears that there was another large rubber store with which Wiegand dealt in those days (p. 88).

He then states that "in using rubber belting scraps *it was common* to cut the strips of belting slantwise," so that it could be bent easier to apply it in circular form, and in using bits of hose for like purposes *it was common* to cut it straight with the line of the hose, as it was then found that the strips were more flexible (p. 60), and that in applying them, in conjunction with these, additional pieces of India rubber were employed, so as to help pack them and make them elastic; that for convenience in applying such strips of belting or hose in conjunction with the rubber, wrappings of lamp-wick were used to hold the parts together, the elastic part of the rubber being put next to the stuffing-box or on the circumference of the packing, and the cloth layers inside against the rod.

"Q. Have you seen used, or have you used yourself, the various packings which you have described in your answer to the last question?

"A. I have repeatedly, both in engines of my own, and those I have sold to others and repaired for others" (p. 61).

He states that he cut the belting diagonally (p. 61):

"Because I *found* that *when I cut it straight the old pieces of belting* would frequently break on the outer edge instead of bending; the belting before I used it had been *pretty severely tried in running grindstones.*"

This witness produces Exhibit H, for the purpose of showing the kind of packing that he made out of a piece of belting, except that it differs from it in some particulars (p. 63). He also states (p. 64) that he used strips of hose also to make things like Exhibit H.

Referring to Tuck's English patent of 1854, he states (p. 66) that he recognizes figures 1, 2, 4 and 9 as like packing that he *has seen exhibited as samples*. He also says (p. 67):

"*The practice is pursued* in using such packing of cutting that to the breadth, to adapt them to the spaces between the side of the stuffing-box and the piston rod, which subjects more of the ends of the fibres and threads and less of the surface of the cloth to wear, immediately upon using the packing, the relative proportions of which are so subjected to wear, varies according to the line in which the cut is made. The penciled line marked XX., which I find across figure 9, illustrates the direction in which such cut is made, to narrow the packings when the box is too narrow to receive the whole of the packing."

He states that he has seen stuffing-boxes in which such packing was employed—in which it was in that condition; that he *first saw* such worn packing, exhibiting the ends of the threads to wear—"as near as I can tell, as early as 1867" (p. 67).

This is too indefinite as to date if it were of any importance otherwise.

He then proceeds to give his opinion in respect to the various documentary exhibits in evidence in the case. Upon this latter subject we forbear comment, as the positions which he takes are fully and completely answered by the evidence of Mr. Brevoort. All that we have now to do with is that portion of his evidence in which he *furnishes the facts*. In speaking of the packing represented by defendants' Exhibit H, he says (p. 74):

"When in the stuffing-box it worked just in the same way—the lamp-wick was mere surplusage for convenience in the application, the rubber not being cemented to the bit of old belt or hose, it was convenient to secure them to each other by wrapping them with lamp-wicks. After they had been used and packed down by the gland, it became the same thing in performance; *it was not so con-*

venient in application, on account of being patched up that way."

He again speaks of the use of strips of old rubber hose and old rubber belts for packing as "one of the *most common* engineering expedients" (p. 78).

Commenting, however, upon the state of the art, especially with reference to the thing complained of as an infringement, marked "Complainant's Exhibit Trenton Rubber Works, May 27, 1884," he says:

"I didn't know as early as that though, that there was any such packing made exactly as 'Complainant's Exhibit Trenton Rubber Works, May 27, 1884,' * * * I wasn't aware of the existence of such packings as this at that time (1866), in which the rubber was already fastened to the packing, with the diagonal cut edge of the cloth made ready for the use by putting and connecting them together one with the other with an outer canvas covering" (p. 79).

In respect to the practical operation of such make-shifts as are shown in Defendant's Exhibits D and H, this witness again states (p. 80) something that is tangible, and that complainant is able to disprove. He tries to make the point that when a strip of old hose or belting and a strip of vulcanized India rubber are tied together with lamp-wick and placed in the stuffing-box, and the follower screwed down, the heat of the steam will in a short time cause them to adhere together, the inference designed to be drawn being, that in this way the articles after a time *would become in the stuffing-box* something similar to Gately's patented packing. As a matter of fact *no such adhesion would take place* between the strip of already vulcanized India rubber and the layers of duck or canvas and vulcanized rubber composing the strip of hose or belting.

This is demonstrated by experiment as well as proved by a competent expert (pp. 120–122). In this connection

it is instructive to contrast these make-shifts, like Defendant's Exhibits D and H, as shown in Complainant's Exhibits Jones Nos. 1 and 3, after ten hours' use, with Complainant's Exhibit Jones No. 2, which is a piece of Gately packing taken out of the stuffing-box after two months' use (pp. 120–122).

A rather amusing instance of the mode in which this expert builds his opinion upon the evidence, is shown in the latter half of page 82.

On the cross-examination Mr. Wiegand showed that he was retained as expert in this cause in the middle of October, 1884 (p. 84). That he inquired of Harrison as to what he had done in the Confederate service, and that he told him "of *some makeshifts that they had to employ when they had not the material at command they wanted*" (p. 84); and that he recounted to him "some of the *packing expedients he had resorted to*" (p. 84). It also appears that he made inquiries among the employes of the two great, old-established rubber stores in Philadelphia (pp. 85, 88), and also among other persons, whether engineers, rubber dealers or persons engaged in other employments, and that there were quite a number of such persons, not more than twelve nor less than six, of whom he had made such inquiries, and who had not been called as witnesses. He cannot remember the precise number, because he had "an extensive acquaintance with engineers and men in machine trade and machine supply trade," most of whom did business in and around Philadelphia, but others of whom were scattered around in different parts of the country (p. 85).

If the state of the art was as he would have us believe from his testimony, it is astonishing that his diligence in trying to corroborate his own statements was not better rewarded. It is strange that none of these people were called to tell us about these "common expedients."

He appears to have been engaged in business as a manufacturer of druggists' machinery and apparatus, and some other machine work from the time he was 21 years of age, in 1854 down to 1868 (p. 85), when he went out of business, and subsequently went through bankruptcy (p. 87). He says, "I made most of the machinery, and the largest part of the work *I attended to* was to find the money to carry it on with" (p. 85). Since 1868 he has been a consulting engineer and solicitor of patents and expert in patent causes. His cross-examination upon the subject of the amount of his experience in packings will show that it must have been *exceedingly limited*. He states, substantially, that packings were either sold by the two rubber stores in Philadelphia, or by machinery and belting supply stores in those days (p. 88), but it is left very uncertain as to whether he ever purchased any stuffing-box packings, (which is the only kind that we have to do with in this suit,) from the rubber stores (p. 88), and in respect to the quantity of stuffing-box packing purchased from the machinery supply dealers, he says (p. 89): "I could not tell now; we did not use a great deal of it." Being questioned more closely in respect to his purchases of stuffing-box packing from machine supply dealers prior to his retirement from business in 1868, he says (p. 90):

"I am certain that I got some from Pratt & Freeman, because Mr. Pratt asked me what I thought of it, and how I liked it.

"Q. Was this rubber packing?

"A. *I think it was*, it was packing that was laminated; a cloth laminated stuff.

"Q. Did you suppose it to contain india rubber?

"A. I suppose it was india rubber and cloth together; it had the sulphurous smell of india rubber."

He describes what he did when he packed the engine with the piece of old belt and the sheet rubber wrapped with common lampwick (p. 90). This was done in the

presence of Jacob Stiner, who is now dead. He states also that Henry Stuhl, his father's engineer, had previously used old belting to pack an engine. He also speaks of a third instance in which he saw a piece of rubber belting used for the purpose of a packing (p. 92) by one Parry, but Parry did not use any strip of elastic rubber. He also states that he saw a piece of belting used for packing an engine that he sold to Mr. Lever, the witness previously spoken of, and that Lever was present at the time (pp. 92, 93).

His statement at pages 94 and 95 may be profitably contrasted with what he said at page 61, in reference to what he found practically to be the result of cutting pieces of belting straight, instead of cutting them bias. He states also (p. 95), that he cut some hose up in his shop in 1862, in order to put it into a small oscillating engine for a steam yacht. He can specify no other instance of such use (p. 96).

Being cross-examined in relation to specimens of the packing shown in Tuck's English patent of 1854, that he stated on his direct that he had seen exhibited as samples (p. 66), he states that these samples were shown to him at the Franklin Institute, where they were on exhibition; they were a foot or less long. He does *not remember the date* when he saw them (pp. 96, 97); and in respect to his having seen that which is shown in Tuck's English specification of 1854, he testifies as follows (p. 97):

"Q. Is it not true, referring to Tuck's specification and drawing of 1854, that except at the Franklin Institute on the occasion of which you have spoken, you never saw any specimens of Tuck's packing like figures 4 and 9, and that you have never seen any specimens like figures 5, 6, 7 and 8 anywhere?

"A. I have no knowledge of having seen 5, 6, 7 and 8 anywhere. I think I have seen some small bits of figures 4 or 9, or forms intermediate between 4 and 9, which I

had been informed were out of blockade runners' engine supplies. The pieces were too little to be used, otherwise it is true.

"Q. Where did you see them?

"A. They were shown to me in Philadelphia, at the Navy yard. I presume for curiosities. One of the workmen showed them to me; I can't think of his name just now."

Wiegand's general loose statements to the effect that it was "a common expedient among engineers," prior to the date of Gately's invention to use pieces of hose and pieces of belting for the purpose of steam packing, is effectually disposed of by the testimony of William Carlisle, Matthew D. Davidson, William Craig and Frederick H. Rickers, engineers of large experience, who show conclusively that no such practice could have existed or been commonly known in the art (pp. 104–107, 107–110, 122–124, 124–128).

Complainant's evidence in reply also throws great doubt upon the statements of defendants' witnesses in respect to cutting down pieces of Tuck's packing, and exposing the mangled or cut part to the vibrations of the piston rod. Carlisle, a very experienced and intelligent engineer (pp. 105, 106), shows that no intelligent engineer would have treated the packing in any such manner, as it would certainly greatly impair its usefulness. See, also, the evidence of Mr. Brevoort to the same effect (pp. 139, 140).

Mr. Brevoort also shows that he made packing of the form shown in fig. 9 of Tuck's English patent of 1854, and it was so stiff as to be useless. It differed from the packing of that patent in that it was vulcanized (p. 144). Of course the same result would be produced if the form shown in fig. 4 were so made. Mr. Brevoort's evidence upon this point is not contradicted.

The evidence of defendants' witnesses in relation to cut or worn "Tuck's packing" is entirely irrelevant for

another reason—they do not prove that the packing that was so dealt with was vulcanized.

THE RULE AS TO PROOF OF PRIOR KNOWLEDGE.

The authorities on the subject of what constitutes proper proof of prior knowledge are familiar, but it may not be out of place to refer to some of the decided cases.

In Cantrell *vs.* Wallick (117 U. S., 695), the Court says:

"It remains to inquire whether prior use and want of novelty have been shown. . . . The burden of proof is upon the defendants to establish this defense. For the grant of letters patent is *prima facie* evidence that the patentee is the first inventor of the device described in the letters patent and of its novelty. Smith *vs.* Goodyear Dental Vulcanite Co., 93 U. S., 486; Lehnbeuter *vs.* Holthaus, 105 U. S., 94. Not only is the burden of proof to make good this defense upon the party setting it up, but it has been held that 'every reasonable doubt should be resolved against him.' Coffin *vs.* Ogden, 18 Wall., 120, 124; Washburn *vs.* Gould, 3 Story, 122, 142."

Besides, when a patentee has successfully made an invention, the utility of which has been recognized by the public, it cannot be anticipated by proof of the use by others of mere "make-shifts," the value of which was not recognized by the users. This is true even when the old "expedients" were like the thing patented. Upon a similar principle, mere accidental use by a person is not conscious invention. He does not know that he has invented anything and hence cannot know that he has anything to offer to others. (See Comr.'s decision in The Telephone Interference, 30 O. G., 1093, citing *Colgate* vs. *Western Union Tel. Co.*, 15 Blatch, 365; *Tilghman* vs. *Proctor*, 102 U. S., 707. See also *Clough* vs. *Barker*, 106 U. S., 166).

The very fact that the alleged "make-shifts" were not

considered by the users as improvements over what had preceded them, but were recognized as mere inferior expedients, is positive proof that they differed substantially from the patented invention.

The language of Mr. Justice Swayne, in *Wood* vs. *Cleveland Rolling Mill Co.*, 4 Fisher, pp. 559 to 560, is peculiarly applicable:

"In the fossils of geology, belonging to certain classes of animals, regular gradations from a low form of organism to a much higher one are found to exist. The contrast between the highest and the lowest is very striking. The same thing takes place in the progress of inventions. Models and machines in the same series, upon inspection, not unfrequently exhibit curious points of analogy to such fossils. Sometimes one will be found to reach almost the highest point afterward attained, but to fall short of it.

"The difference is that between success and failure.

"When a great success is achieved in the field of mechanical invention, and the higher organism is protected by a patent, it is almost as certain that invasions will follow, as that there exists the relation of cause and effect. Such is the voice of universal experience.

"When the infringer is called to account, one of two defenses is usually set up, and frequently both. First, that the invention in one of the lower grades is substantially the same with that of the patentee. The confidence of the attacking witnesses is often in proportion to the distance in time that one is removed from the other.

"Their imagination is wrought upon by the influences to which their minds are subjected, and beguiles their memory.

"When the defense is made out, it is the duty of courts and juries to give it effect. But such testimony should be weighed with care, and the defense allowed to prevail only where the evidence is such as to leave no room for a reasonable doubt upon the subject."

The Subject-Matter is Patentable.

The position taken by the defendants seems to be substantially this: that in view of recent decisions of this Court, holding patentees to a somewhat stricter rule than formerly, in regard to the degree of invention required to support a patent, this patent cannot be sustained. It must be borne in mind, that the opinion of the Court below was filed as late as February 18th, 1886 (p. 146). The leading cases, that tend most strongly to support the view of defendants' counsel on this topic, were decided prior to that time, and cases as late as 116 U. S. were then known to the Court, and a reference to the defendants' brief in the Court below will show, that it contained cases as late as the 114 U. S., although the argument took place many months prior to the decision.

The cases decided by this Court, which have held patents void for want of invention, have no application to the case at bar.

One of the latest decisions upon this general subject is *Western Electric Company* vs. *LaRue* (139 U. S., 601), which was certainly a much stronger case against the patent than the one now before the Court. The patent covered "The combination in a telegraph key, of the lever fulcrumed upon the torsional spring with the adjusting screws H and H′, for regulating the amplitude of the lever movement and the retractile resistance of the torsion-spring, substantially as described." Torsional springs were old and coil springs had been used to regulate the movements of telegraph keys, adjusting screws were old, and a very similar device was old in pole-changers. Nevertheless there was held to be sufficient invention to support the patent, although the Court said (p. 605), "the invention does not seem to be one of great importance."

In *Hurlbut* vs. *Schillinger* (130 U. S., 456), the invention was a much simpler one than that now before the

Court. It merely consisted in dividing a concrete pavement into blocks, so that one block can be removed and repaired without injury to the rest of the pavement, the division being effected by either a permanent or temporary interposition of something between the blocks. Concrete pavement had been laid before without being divided into blocks (p. 465), and it was a matter of common knowledge, that from time immemorial all other kinds of pavement had been laid down in separate sections, pieces or blocks. The invention proved to be commercially valuable, and therefore this Court sustained the patent.

In *Cantrell* vs. *Wallick* (117 U. S., 689), the object of the patent was the "rapid and economical production of enamelled mouldings" designed to be gilded and used for picture and mirror frames and other like purposes. The invention was a very simple one, consisting of an enamelling box divided into two compartments by a slotted partition, and having openings at the ends in a line with the slot in the partition. The Court sustained the patent and said (p. 694): "The great majority of patents are for improvements in old and well-known devices, or on patented inventions. Changes in the construction of an old machine which increase its usefulness are patentable. *Seymour* vs. *Osborn* (11 Wall, 516). So a new combination of known devices, whereby the effectiveness of a machine is increased, may be the subject of a patent, *Loom Co.* vs. *Higgins*, 105 U. S., 580."

In Loom Co. *vs.* Higgins (105 U. S., 580), the Circuit Court had held the patent void. This decision was reversed by this Court and the patent sustained. The Court says, page 591:

"It is further argued, however, that, supposing the devices to be sufficiently described, they do not show any invention; and that the combination set forth in the

fifth claim is a mere aggregation of old devices, already well known; and, therefore, it is not patentable. This argument would be sound if the combination claimed by Webster was an obvious one for attaining the advantages proposed,—one which would occur to any mechanic skilled in the art. But it is plain from the evidence, and *from the very fact that it was not sooner adopted and used*, that it did not, for years, occur in this light to even the most skilful persons. It may have been under their very eyes, they may almost be said to have stumbled over it; but they certainly failed to see it, to estimate its value, and to bring it into notice. Who *was* the first to see it, to understand its value, to give it shape and form, to bring it into notice and urge its adoption, is a question to which we shall shortly give our attention. At this point we are constrained to say that we cannot yield our assent to the argument, that the combination of the different parts or elements for attaining the object in view was so obvious as to merit no title to invention. *Now that it has succeeded, it may seem very plain to anyone that he could have done it as well.* This is often the case with inventions of the greatest merit. It may be laid down as a general rule, though perhaps not an invariable one, that if a new combination and arrangement of known elements produce a new and beneficial result, never attained before, it is evidence of invention."

In Lehnbeuter *vs.* Holthaus (105 U. S., 94, 96), the subject-matter was a design for show cases. The Court below had held the patent void and dismissed the bill. This decision was reversed by this Court and the patent was sustained. The Court says (p. 96): "The patent is *prima facie* evidence of both novelty and utility, and neither of these presumptions has been rebutted by the evidence. On the contrary they are strengthened. No anticipation of the design is shown, although the attempt has been made to prove anticipation. *The fact that it has been infringed* by defendants, is sufficient to establish its

utility, at least as against them. Whitney *vs.* Mowry, 4 Fish. Pat. Rep., p. 207."

In Sharp *vs.* Stamping Company, 103 U. S., 250), the Court below had held the patent to be void. This decision was reversed by this Court and a decree finally entered for the complainant. The invention was a very simple one, consisting of a gas stove for broiling steak by gas. The steak was placed upright in an ordinary wire broiler and the flame was split into two parts by a deflector below the steak so that the steak was heated on both sides at once, and above the deflector below the steak was placed a V-shaped trough protected by non-conducting material to catch the drippings, and at the same time prevent them from being burnt. Notwithstanding the simplicity of this contrivance it was held that being both novel and useful, it was fully protected by the letters patent issued to the inventor.

The remarks of Judge Wallace, in Palmer *vs.* Johnston (34 F. R., 336, 337), furnish an appropriate answer to the contention of a defendant where it is sought to show that a useful device is not patentable on account of its simplicity. The learned Judge says:

"Cowell's improvement was *a very simple one*, and it is *easy to assert now* that any competent mechanic in that department of industry could have made it by the exercise of ordinary mechanical skill. *Indeed, it seems surprising now that no one had made it;* but no one had, although many kinds of pulley boxes had been made, and some had been patented; and *as soon as this one was made and introduced its advantages were manifest and it commended itself to the public as a practicable and desirable device*, and a better one than those which had preceded it. THESE CIRCUMSTANCES AFFORD A SAFER CRITERION OF INVENTIVE NOVELTY THAN ANY SUBSEQUENT OPINION OF AN EXPERT OR INTUITION OF A JUDGE. The defendant has appropriated the invention of the Cowell patent, and a decree is therefore ordered for an injunction and an accounting."

In the leading case of *Smith* vs. *Goodyear Dental Vulcanite Co.*, 3 Otto, 486, it was held that the fact that the thing patented had gone into general use strongly tended to show that the device involved a patentable invention. The Court (p. 495), quotes with approbation *Webster on the Subject Matter of Patents*, p. 30, where he says:

"The utility of the change, as ascertained by its consequences, is the real practical test of the sufficiency of an invention; and since the one cannot exist without the other, the existence of the one may be presumed on proof of the existence of the other. Where the utility is proved to exist in any degree, a sufficiency of invention to support the patent must be presumed."

Extensive public use which results from the utility of the thing patented, tends in the strongest manner to prove that the subject-matter is patentable, and, to use the language of the Court in the case of *Smith* vs. *Goodyear Dental Vulcanite Co.*, "when the other facts in the case leave the question in doubt, it is sufficient to turn the scale" (p. 496).

Applying this doctrine to the case at bar, the manner in which this patented packing has been received by the public, fully establishes the patentability of the subject-matter.

We refer the Court also to the case of *Winans* vs. *Denmead*, 15 How., 330, to show how simple an invention may constitute a patentable subject-matter.

It is upon analogous principles that numerous patents, involving the substitution of one material for another, have been sustained. Such patents will always be held valid where "some new and useful result as increase of efficiency or a decided saving in the operation be obtained."

Smith vs. *Goodyear D. V. Co.*, 3 Otto, 486, 496.

Walton vs. *Potter*, 3 Manning & Gr., 438.
Gayler vs. *Wilder*, 10 How., 477, 483, 3d exception, p. 484.

The proofs leave no doubt upon the point that the invention was new, and there is overwhelming proof that it was useful in a very high degree. Gately, the inventor, an experienced manufacturer of this class of rubber goods, shows, that he accomplished the result aimed at only after repeated trials and experiments, extending over a period of a number of months. He states that the circumstances, which led to his making the invention, were, that his company had previously manufactured the McBurney packing, and they had complaints of its being very rigid, and not easily compressible, so as to make a tight joint in stuffing-boxes, and the people at the store wrote the factory to have experiments made to see, if, by a new packing, the difficulty could not be overcome. Gately made several trials and finally hit upon the way described in his patent (p. 98, 99).

On cross-examination he is asked (p. 98):

"X-Q. How do you fix the time at which you first conceived this idea of this packing, and perfected it?

"A. Well, I have no particular data to go by—no records, no memoranda that I made that I can refer to; but from general recollection, and from the fact of the people writing up from time to time about this unsatisfactory packing of McBurney's, and my general memory of the thing, that it was *at least six months that I was trying to bring this thing about, and finally hit upon this final way.*

"X-Q. Do I understand *that you experimented?*

"A. *Yes. I was trying different ways of working at it;* I cannot tell exactly what I did at the time, it is so long since that I have forgotten about it."

In respect to the usefulness of the new article, Gately states that when his patented packing was put upon the market it "proved to be very satisfactory. The sales immediately commenced to be large, and very soon we sold more than of the other kinds" (p. 98).

On cross-examination he testifies (p. 99):

"X-Q. Did you begin the regular manufacture of it as soon as you had been able to turn out a perfected article?

"A. Very soon after; it was *so very satisfactory to our people at the store*, it was put upon the market, and it was received at once as being *a great improvement* on the others."

Mr. Roby, who was engaged at the store of the New York Belting and Packing Company at and before the time, when the invention was put upon the market, gives the following account of the circumstances, that led to this invention (p. 100).

"We were selling quite freely the fibrous strips and McBurney's square packing, and the engineers and others used to complain that when their stuffing-boxes were not exactly true they had difficulty in pushing this out against the rod, and I was continually suggesting to our superintendent if there was not some way that he could improve that fibrous packing, or McBurney's packing, so that we should not have so much complaint. This I began at least a year before the Gately patent was issued. My recollection is that Mr. Gately sent in to us, from time to time, before the patent was issued, *samples, on which we noted our objections to him, and he improved on them.*"

Roby further says (p. 102):

"Q. When the Gately packing, covered by patent No. 86296, was introduced upon the market, how did it turn out as an article of manufacuture?

"A. Immediately on the introduction of this packing we began to receive orders for it from the engineers. We sent it to all our agents throughout the United States,

and immediately large sales followed, *so much so as to supersede in a large measure the sale of the McBurney packing and Tuck's round packing.*

"Q. Can you give a comparison between the prices at which the Gately, McBurney and Tuck packings were sold in competition with each other?

"A. The Gately packing was sold for from *fifteen to twenty per cent. higher price* than the McBurney or Tuck's round packing.

"Q. What was the relative cost of manufacture of these three kinds of packing?

"A. During those years Gately's packing would *cost on an average of ten per cent. less* than McBurney's packing.

"Q. Why do you particularly limit your answer next before the last to Tuck's *round* packing? Did you make any other at that time, or was there any other made at that time?

"A. There was no other made, no; that is the only Tuck's packing that ever I saw in the market or heard of.

"Q. Who is the largest manufacturer of rubber packing in the United States?

"A. I am not prepared to answer that; you mean now, don't you?

"Q. Who was in 1869 the largest manufacturer of rubber packing in the United States?

"A. At that time the New York Belting and Packing Company was by far the largest manufacturer."

Mr. Brevoort shows that, in view of the state of the art, the subject-matter of the Gately patent involved invention. He says (pp. 118, 119):

"Q. Asssuming the existence, at a time prior to Gately's invention, of the devices described and shown in each of the Letters Patent other than the said Gately patent heretofore referred to in your examination, and assuming also the existence, at a date prior to Gately's invention, of all the various kinds of packing referred to in the testimony of the witnesses called on behalf of the defendants, please state whether or not, in your opinion, the subject-

matter of the Gately patent does not involve something more than mere mechanical skill?

"A. Yes, I think it did involve something more than mere mechanical skill. Certainly Gately produced a new article. He produced an article consisting of a homogeneous stuffing-box packing having a wearing portion which was alike throughout when subjected to wear, and this wearing portion he combined with an elastic or springy backing of such a nature as to make the wearing portion of the packing efficient and useful; and he did this, not by using a third element in the shape of canvas, lamp-wick or metal bands wrapped around the two parts, but he united the springy portion and the portion which is to be subjected to wear by the same means of union as was adopted to unite the layers of canvas themselves together, thus creating for the first time a homogeneous packing possessed of qualities which were not possessed by any packing before the date of Gately's invention—that is to say, it had a large wearing and oil-absorbing portion which presented the same surface or the same character of surface to the piston rod from the day the packing was first put into the box until it was removed. He gave to this portion which was subjected to wear, the capacity of making a tight joint by locating between it and the walls of the stuffing-box a highly elastic portion, adapted to press the wearing portion in contact with the rod. He effected a union between the wearing portion and the elastic backing by means of vulcanization, and without the use of additional substances or materials, which would have, if used, to be worn through before the true wearing portion of the packing was reached. He united the two parts, therefore, in such a way that the position of the packing in the box was assured, and in such a way that the union was never broken by the wear of the piston rod upon the packing. The evidence shows and my own experience has taught me, that the invention was one and the article was such that there was a great demand for it; it commanded a higher price in the market, and was recognized as a substantially different thing from anything that had gone before it; consequently I think that invention was required to produce an article

having such characteristics and such capacities. I do not mean to be understood as saying that Gately was the first man who made a packing which would efficiently pack a stuffing box, because he was not, but he was the first man to make this kind of packing, which was recognized as having advantages over other styles of packing which were in the market before Gately produced the kind described in the patent. I think this is conclusive evidence that what he did constituted an invention rather than consisting of a mere rearrangement of old parts, which would have involved nothing novel. On the other hand, what Gately did seems to me to have involved invention, producing a *new article* when compared with anything that had preceded it in the art."

Conclusion.

The decree of the Circuit Court should be affirmed, with costs.

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